

INTERGENERATIONAL INTRA-HOUSEHOLD ECONOMICS: THREE ESSAYS ON PARENTS AND OFFSPRING

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INTERGENERATIONAL INTRA-HOUSEHOLD ECONOMICS: THREE
ESSAYS ON PARENTS AND OFFSPRING

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The bulk of the literature on intra-household allocation discusses the relationship, power, and division of family resources between husband and wife. Seeking a wider understanding of family, researchers have broadened their scope to an intergenerational level, the dynamics of a parent and child are the focus of the first two papers: the first a two-stage theoretical discussion, and the second an empirical cross-sectional study. The third paper is a companion piece to the second, using the fieldwork as a case study.

Paper 1 Intra-household literature focuses on bargaining power between husbands and wives, but does not consider the process between parents and children. The bequest literature asks how parents pass on wealth to their children but generally ignores the possibility that later in life parents may be co-dependent with children. Drawing on both arenas of family analysis, I present a model representing the nature of negotiation that may happen between parent and child: in stage one the parent is the sole decision maker, and then in stage two the child grows to participate in the bargaining process. The education decision the parent made in stage one affects the second period outcome; the child has more bargaining power with higher levels of education. A simplified analysis is done first with purely selfish participants, and then with a purely altruistic parent in a bequest model. These two extreme models are combined to form a model with both self-interested and altruistic components accruing to

parent and child, a more realistic scenario. The contrasting models of a purely selfish parent with a purely altruistic parent provide insight as to how an intermediate result emerges in this model, which incorporates both characteristics. I conclude with a discussion of what would happen if a separation option is available, interpreted as an alternative wage scheme under migration.

Paper 2 Within the literature on intra-household allocation I discuss a new population: teenage mothers and their mothers in Salvador, Brazil. A household survey and experimental games are the techniques used to analyze decision-making. A trust game tests for efficiency, and another game elicits valuations of a counting book, a newly introduced educational toy, to test for bargaining at the population level. While the experimental good is not representative of all elements comprising a baby's welfare, nor do these interactions purely reflect all household bargaining, this new method of analysis can be helpful when deciding policy for welfare transfers when endogeneity complicates econometric technique or when impoverished families are omitted from standard analysis due to a lack of private goods. At the population level, I find little evidence of bargaining, and Pareto efficient families' willingness to pay for the counting book is lower than the others'. The variety of behavior in the games suggests multiple family structures, some outside the typical models, and responses to the sociological questions included in the survey indicate complexity of household dynamics.

Paper 3 Tension has long existed between qualitative and quantitative research methodologies, but there is a movement to reconcile them within development research practices. This is an ongoing process, seeping into mainstream development economics, but instruction of qualitative methods for economists is not emphasized. Besides making a case for qualitative methodology, I also

offer my research in Salvador, Brazil, as a case study that highlights how qualitative and quantitative research can interact to inform policy. I employ both quantitative and qualitative research to determine the family structure of teen mothers who live with their mothers. I also use both techniques to identify risks faced by their children. Then qualitatively I analyze the three models of social support offered to teen mothers in Salvador: community groups, home visits, and conditional cash transfers. Considering the children's risks and family structure, I conclude with suggestions of how the Brazilian government can coordinate social efforts through the Bolsa Familia program.

BIOGRAPHICAL SKETCH

Sarah Reynolds graduated from Calvin College in 2001, having majored in Economics and Spanish and minored in English, third world development and mathematics. She then moved to Bogota, Colombia on a Fulbright student grant. The following year she taught English at the Jesuit high school San Bartolome La Merced. She began graduate school in the Cornell economics program in 2004, funded by a FLAS fellowship. Over the course of her graduate studies, she has taken classes in anthropology, city and regional planning, industrial and labor relations and Spanish. She also enjoyed participating in the Sage Chapel Choir, Capoeira, and the Ithaca community summer band.

This document is dedicated to the leaders of the *Pastoral da Criança*.

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I especially thank Lourdes Beneria for comments and guidance on the third paper, and I appreciate the anthropological participants at the Social Science Research Council Conference for their inspiration and encouragement. Again, Gina Reynolds' patient proofreading has been invaluable.

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CHAPTER 1

INTRODUCTION

As I explain my dissertation topic to new acquaintances and my parents' friends, many are surprised that the degree is in economics. The discipline conjures up images of stock markets and firms, not families and children's books. As the only economist at the Social Science Research Council IDRF post-field work conference, my fellow award recipients were impressed that my topic was more aligned with their ideas of sociology than economics. (And, ironically, it was the political scientists who were studying firms.) At times, I have wondered if I am studying in the wrong field. In this introduction I take a step back and discuss how my topic fits into the subject of economics, explaining the thread of research whence it comes. Most of this explanation can be found at a more technical level somewhere within the body of work, but this introduction is the overarching story for non-economists and a reminder to myself that I am not in the wrong field after all.

At a basic level, microeconomics can be divided into two foci, the consumers and the producers. Historically, the unit of analysis is firms on the producer side and individuals on the consumer side. Leaving aside the complications of employees, managers, and work incentives, we face our own problems on the consumer side of things: when consumption data is collected, it is usually at the family level. Apartments are rented for entire families, food is not rung up at the checkout counter on a per-child tab, and soccer balls and ping-pong tables are used by all family members, not to mention the neighborhood friends. This leaves econometrics in a predicament: theory is based on individual choices but the data is a result of family dynamics.

While economists always recognized that families are made up of individuals, innovations in game theory allowed clever modelers to apply them to the household. Models of household decision-making came to explain how a family's purchases reflect the non-aligning preferences of husband and wife. 'Whose preference gets more weight and why?' is key to these discussions. The simplest case is only one person making all the decisions in the household or that the household is in such harmony that no matter who makes the decision the outcome would be the same. Some speculate that the spouses make their own decisions in different realms of household life. For example, the wife decides on the espresso machine and furniture while the husband gets to pick the make of the car. Other models suggest that negotiation happens in all spheres, with bargaining power determined by a variety of factors: education level, percent of income brought to the family, social status, age, etc.

Laws can affect bargaining power as well. For example, physical strength should no longer influence the family's decision if domestic violence is severely punished. Likewise a woman may have more power in bargaining if she will be awarded much alimony in the case of divorce. These latter considerations suggest that certain factors improve not only women's bargaining power but also welfare. A natural transition to development economics emerges when we consider the welfare of those in developing countries. Women's issues are of special importance as many women are treated relatively worse in these countries than in western ones. Children's welfare has also come into the discussion. Education and nutrition have improved for children when women are targeted with cash transfers, one of the factors that likely affects bargaining power. Since education and nutrition are key elements of poverty alleviation, this has further cemented the topic within economic development circles.

Yet family composition is not always mother and father and children, especially in developing countries. Frequently grandparents are present, or an older child does not move out right after college. Whether due to the cultural context or economic necessity, these larger families with a different set of actors as decision makers mean that western theory must be modified to take these varied relationships into account.

My first paper, "Selfish, Selfless, or Both: Intergenerational Education Decisions Bargained Under Competing Models," presents some key points of the relationship between parents and children and illustrates how these can be incorporated into a two-stage model. First, when the child is very young, he has no power at all, but will grow into having bargaining power when he is older. The degree to which he acquires power will be based on his educational attainment, a factor that will allow him to earn money and influence the family. The parent must decide how to prepare for the future: save in a bank or invest in his child's education. A selfish parent may foresee that he shall lose his influence and limit his child's educational attainment; he sacrifices a loss in total family income in favor of his own consumption, which would be at risk should the child attain much wealth. A selfless parent is not concerned for his own consumption, but educates and invests in such a way that the child will have maximum income in the future. Most parents, however, are neither selfish nor selfless; a combination of these two simple models brings more complexity. These key points are aspects of a basic model that can be used as a building block for further developments in theory.

"Intergenerational Intra-Household Allocation: Teen Mothers and Their Mothers in Salvador, Brazil" studies the interactions of this specific popula-

tion of parents and children. This is an important population for the field of intra-household allocation; not only do we have the parent-child dynamic, but there is a third party, the teen's child, whose welfare is affected by their decisions. The data was collected in Salvador, Brazil, from teens who lived with their mothers and participated in the NGO Pastoral da Criança. Questions about decision-making were included on survey, with a focus on care for the teen's child. The responses suggest that, in a typical family, while the teen is designated to be principally responsible for her child, her mother makes overarching decisions for the entire household. The family also participated in two experimental games. For one of them I designed and produced a counting book over which the two bargained about how much they would be willing to pay to purchasing it. Comparing the mother's individual valuation for the product to the grandmother's may indicate relative preference for the child's toy and a joint valuation illustrates the bargained result. I find little evidence of bargaining when analyzing the results of this game. The other game gives players a sum and asks participants to contribute to a hat, which has the 'magic power' of doubling all money inside. The participants each own the hat once, and the test of trust is if an individual contributes to the hat when the other person is the owner. In about a third of the families results are inconclusive, as the set-up proved difficult for some to understand. In about a third of the families both teen and her mother contributed all their wealth to the other person. In the final third, where some wealth was withheld, it was a small amount, suggesting that these families still share a significant amount of trust. "The Interaction between Quantitative and Qualitative Research in Development Economics: A Case Study" is tightly linked to the second paper, explaining the qualitative methodology used in data collection, as well as offering a few anthropological

style observations. It does include further insights into the relationships between teen mothers and their mothers, as well as the Brazilian context in which these families are located. This is not the focal point, however, so this work is less directly about parents and children than the other papers in the thesis; it includes much commentary on the state of qualitative research in development economics today and how to incorporate it into quantitative fieldwork.

This thesis is also connected by a thread of feminist thought. Family economics has grown in part due to feminist concerns, with critiques of harmonious families or masculine decision makers pushing for advances in models with active women. Without these advances, the natural transition from considering interaction between husband-wife to that of parent-child would not have arisen. Clearly, my fieldwork takes a feminist focus, with the population in question composed entirely of women. The final paper echoes a feminist critique of economics, a field which emphasizes 'hard' quantitative research to 'soft' qualitative studies. It is my hope that this dissertation is a contribution to the feminist agenda through meticulous scholarship, illustrating the importance of these topics in their own right.

On a more humorous note, now that I am married, sometimes people ask if my husband and I are going to start a family and I tell them my dissertation is my first child. The experiences told here are my relationship with my offspring!

CHAPTER 2

SELFISH, SELFLESS, OR BOTH? INTERGENERATIONAL EDUCATION DECISIONS BARGAINED UNDER COMPETING MODELS

2.1 Introduction

The literature on household economics historically bases theory on nuclear families. Though this strategy helps keep models simple, in reality more complex household structures prevail. The while countries like Italy offer examples of families staying together for cultural reasons, in developing countries the motivation leans toward economic rather than cultural (although these days it may be also the case in Italy). Sometimes families share dwellings with relatives to reduce costs. Frequently children live with their parents until married, or a family may welcome elderly grandparents who are unable to sustain themselves as pensions are uncertain or minuscule. A cousin from the interior lives with an aunt in order to attend the university in the city. Even in the United States family structure is evolving. I remember telling my friends abroad that Americans were very independent: when a child leaves for college she never goes back to live with parents. Returning to live in the US three years later I was taken aback that this is also a changing trend: several of my friends and my sister's friends had moved home with their parents after graduation.

A complex family structure implies that standard bargaining models are insufficient for a comprehensive analysis of a family's allocative decisions, yet the bulk of intrahousehold bargaining literature only consider husband and wife. While this has been helpful to establish a framework for initial study, further theoretical advances are necessary. A more realistic model would allow for the

plurality of actors as well as the different relationships between them. While economics does offer tools to consider multiple actors in bargaining situations, and, as mentioned before, has analyzed in depth the relationship between husbands and wives, what is lacking in the literature is a model of bargaining between parents and children. The unique character of this relationship suggests that a simple application of existing bargaining models would be wanting because the child's transition from dependent to economic actor is one that the parent influences. Through a child's upbringing, the parent fosters abilities that affect the child's earning power and bargaining skills. When a child is young, the parent can be aware how parenting choices can affect the outcome of a future bargaining situation. In this paper I will focus on developing this aspect of theory. While also an over-simplification of reality, it is one that has not yet been considered. We will be one step closer to a comprehensive model of the family that synthesizes multiple actors and their complex relationships once the simplified parent-child relationship has been explored.

This paper begins with a literature review that traces the trajectory of economic intrahousehold analysis mentioned above. Also reviewed is the bequest literature, where the parent-child relationship has been analyzed before, though the child is not an economic actor. This literature asks how parents pass on wealth to their children but assumes that parents are self sufficient until they die and will not be co-dependent with children. Drawing on elements of both arenas of family analysis, in part three I present a simplified model of selfish actors with two stages: each stage represents a different relationship between parent and child. In stage one the parent is the sole actor and makes decisions for himself and the child regarding consumption, savings, and education. Stage two is a bargaining game after the child is grown and the parent no longer works;

the child is now an actor negotiating with the parent on how to determine consumption. Education and savings decisions from the previous period affect the outcome of this second period, including whether the child decides to migrate. Section four presents a comparable bequest model with a selfless parent to offer results that contrast to those of the selfish parent. Section five combines these two models into one where the parent and child have complex personalities of both selfish and generous components. Having previously examined the simpler models illustrates how the model's forces counteract each other. Section six concludes with a discussion of threat points and how a migration option may influence the results.

2.2 Literature Review

In the initial stages of family economics, intra-family decision making was dismissed. Samuelson's 1951 paper on social indifference curves is one of the first formal economic discussions of differing preferences within the family. Proving the impossibility of social indifference curves, he is conflicted with his understanding of family as a social unit, but he reconciles: "if within the family there can be assumed to take place an optimal reallocation of income so as to keep each member's dollar expenditure of equal ethical worth, then there can be derived for the whole family a set of well-behaved indifference contours relating the totals of what it consumes: the family can be said to act as if it maximizes such a group preference function." Gary Becker's seminal *Treatise on the Family* (1981) maintains this principle, characterizing the family as run by an altruistic dictator. Almost every intrahousehold bargaining article begins by citing him, usually to disagree. Without his controversial statements, the field might not

have grown so much.

The feminist reaction has focused on the bargaining power of wives: “While Becker broke ground by considering marriage to be ‘economic’ in a choice theoretic sense, the economics of marriage in a provisioning sense has always been a topic that few women can ignore. Marriage has often been a woman’s bread and butter” (Nelson, 1994 pg 127). Bargaining models are believed to be more realistic than a single household head making all consumption decisions; they maintain individuality as well as allow for communication and altruism. Amartya Sen’s work on cooperative conflicts helps establish that family relationships are not always harmonious, but neither are they full of cut-throat competition that economists often use to characterize agents (1989). A middle ground can also be theoretically sustainable: a family functions on its possibilities frontier, but the exact location on the frontier is up for negotiation.

At this point most research has rejected Becker’s unitary model as naive. Unlikely the household in complete harmony, or a pure dictator suppressing the preferences of the other members. Instead economists ask if households are efficient. Carter and Katz (1997) suggest that inefficiency may arise out of cultural norms, where men do men’s work and women do women’s work. Udry empirically explores the supply and determines that household allocation of labor in Burkina Faso is not Pareto optimal. Land plots controlled by women yield significantly less than those of their husbands: there is empirical evidence for non-cooperative outcomes (1996).

Another popular model is the cooperative Nash Bargaining; this model predicts a Pareto optimal outcome for the household. The main framework for the model comes from Manser and Brown (1980) and McElroy and Horney

(1981). They show that demand for goods derived from this model, even though achieved cooperatively and Pareto efficiently, do not necessarily fit the neo-classical demand assumptions. This theoretical support allowed economists to break away from the concept of the family acting as a single consumer. Lundberg and Pollak further modified the Nash model to consider the threat points to not be divorce, but a breakdown of cooperation; without cooperation equilibrium reverts to the Carter and Katz outcome characterized by traditional roles and separate spheres for husband and wife (1993).

The collective model also predicts a Pareto optimal household, but does not consider threat points (Chiappori, 1992, Bourguignon and Chiappori, 1992, and Browning, *et. al.* 1994). The collective model maximizes a weighted average of the participants' utility, with the weight being the sharing rule representing bargaining power. With empirical simplicity, all that is needed to determine into which bargaining regime the family fits is an assignable good and changes in exogenous income. For example, how does spending on womans clothing change when the wife wins the lottery as opposed to when the husband does. No difference indicates a unitary model: both share the same preferences or the family has a dictator. Using this technique, Thomas rejects the unitary model in Brazil when considering childrens nutrition (1994). Adam *et. al.* also reject the unitary model in Canada, as does Attanasio (2002) in rural Mexico. Over and over the unitary model has been rejected such that Alderman *et. al.* suggest that this be reflected better in policy: transfers can be targeted to the appropriate household member (1995). In other words, policy makers should have a bargaining game as their fundamental understanding of marriage rather than the unitary model.

Only a few authors have taken the bargaining games to an inter-temporal

level. Kaushik Basu suggests that non Pareto optimal sub-game perfect equilibria can exist in the dynamic Nash Bargaining case (2006). Ethan Ligon also rejects Pareto optimality in unions with equilibria renegotiated over time (2002). Empirical studies of the dynamic models have not yet come forth en masse, but Lancaster, Maitra and Ray find support of this endogeneity in India (2006). Hans Haller achieves a similar non-Pareto optimal result (for the economy as a whole) without the inter-temporal aspect by allowing for externalities among household members which cannot be completely internalized (2000).

Though intrahousehold bargaining is not limited to interactions between husbands and wives (–even Samuelson recognized that his children were making decisions about chocolate and peppermint–), this has been the main focus of the literature (1956). Children in the first world have a smaller economic role relative to their parents than in the developing world, which may be another reason these interactions have not yet been highlighted. “There is a significant cross-cultural and historical variation in the degree to which young children contribute to household income. In some societies they begin to work in the household at the age of 7 or 8, with little or no interruption for education. In others school attendance may begin at the age of 5 or 6 and absorb most of the children’s time until well into adulthood” (Folbre, 1984 pg 307). Carolyn Moehling offers historical evidence of working children engaging in a bargaining relationship with their parents (2005). Though they often had to turn the money over to their parents, they could determine how a portion of it was spent. A cost of living survey in the early 20th century indicates that families with working daughters have a higher expenditure on daughter’s clothing per dollar earned than others. Vegard Iversen finds that some teenage boys in India are making their own decisions regarding migration and work independent of their par-

ents (2002). Reynolds (in progress) finds evidence of bargaining between teen mothers who live with their mothers in Brazil, yet only in some aspects of baby care (2010). Yet even when children are in school, Jim Berry finds evidence of bargaining between between parents and children over studying habits. With incentives for improved test results, outcomes differ when the incentives are directed toward parents from when the incentives are directed toward children (working paper). The trajectory of the intrahousehold literature is leading us to consider relationships as well. These recent empirical findings suggest that intergenerational bargaining is an important issue and a more defined theoretical framework could be helpful.

Yet models are never close enough to reality to avoid critiques. Bina Agarawal identifies some problematic issues for rural women: ownership and control of assets, access to employment and communal resources, support from NGOs and the State, and perceptions, norms, and access to traditional social support systems (1997). Furthermore there may be a meta-bargaining game taking place, with society itself bargaining over social norms, laws, and interpretation of these. Fortunately the critiques help push the field forward, and one successful response to this later challenges is Kaushik Basu's work "Gender and Say", which illustrates a repeated bargaining game may allow for a husband to strategically limit outcomes so a wife does not gain too much power in the future (2006). This paper takes a similar approach looking at how a parent may influence future outcomes between self and child. The difference is that the child always starts with no power and transitions naturally to having some power. In the marriage model the wife often starts with some power, and if she starts with no power, there is little hope for gaining more with out intervention. Not so for the child; as education is inherently valued by the parent, bargain-

ing power increases automatically. The meta-bargaining issue has come to the intergenerational level.

In contrast to the intra-household literature focusing on a horizontal relationship between husband and wife, the bequest literature takes a vertical perspective to the relationship between parent and child. The parent makes the decisions for the child's future with concern for the child attaining maximum wealth. Usually the child does not take part in the decision to be educated or how much his parent will save for his inheritance. As the bequest literature has grown more complex, there are now competing models of parental decision making in this regard. Preferences now come to the forefront: do parents care about equality in wealth, bequests, or expected lifetime earnings of their children? A series of papers explore these nuances (Behrman, *et. al.*, 1995). The wealth model indicates that the total wealth of the child is what matters to the parent; a parent invests in the child's education until marginal returns equal the returns to savings. The separable earnings-transfers model implies that child's income and bequests enter separately into the parent's utility function; there is more scope for parents preference for equality among children. Since I am taking a simplified approach with only one child, the separable earnings-transfers model is not applicable, so we shall leave this discussion for future works.

The child has a small bit of autonomy in what is perhaps the most famous parent-child economic interaction, the Rotten-Kid Theorem, another brainchild of the father of family economics, Gary Becker. Becker's model indicates that selfish offspring will always act to maximize household income in order to maximize a later bequest by the parent, who holds the household purse strings. Thus the child's agency is of no concern for the parent. However, Theodore

Bergstrom refines the to say that this only happens under a certain set of utility functions; incentive problems are not always solved simply by the presence of a benevolent household head (1989). In my model I allow for both child agency and the parent's choice of considering future child consumption.

2.3 A Bargaining Model of Parental Selfishness

My theoretical model draws from these two literatures of intra-household bargaining and the bequests, using education as an example of a factor that influences the child's bargaining power, but also one which the parent chooses for the child and will influence future income. In the initial set-up, the goal of the parent is not to pass along wealth to the child, but to maximize his own consumption. However, in period 2 the parent will be partially dependent on the child for income so by increasing the child's education, he may be increasing his own welfare as well as that of the child's; on the other hand, by giving his child more power, parental consumption may be reduced. Though our inner psyches writhe against the selfish parent, other economists have likewise toyed with similarly sinister thoughts. Dasgupta illustrates a possible conflict of interest between parents and children when a government shifts transfers from one parent to the other (Dasgupta, 2009). To avoid complete unorthodox assumptions, a component of generosity will be integrated later, but since the altruism complicates effects and makes results more ambiguous, the final analysis shall be done also with a numerical example. For the time being we shall stick to our variables in this less accurate, though darkly elegant, analysis as we establish the framework for the more complex application.

The model is a simplification of the family into a mere parent-child relationship. Though unrealistic, such mental experiments on this theme have been undertaken before and likewise draw lessons to promote contemplation. Mary Shelley's *Frankenstein* morally questions the endowments given to offspring. Victor Frankenstein takes on the power of creation to build a man of unequalled physical perfection. Of course, his creation gets out of hand and results in a monster. When the two have a disagreement in preferences (the monster wants a wife and Victor does not want to make him one), Victor's choices in making the monster come back to influence the outcome of this "bargaining" process. We can only imagine that Victor would have rather preferred to endow his creature with less physical capabilities had he been able to foresee the course of events; this foresight effect is precisely what this model describes.

Since this model is solved using backward induction, I begin by describing the outcome of period two, the bargaining period. I use a collective model, which is commonly used in the intrahousehold literature. With this outcome I return to period one, where the parent is making consumption, education, and savings choices which influence utility in both periods; the decisions taken in period one are those which maximize the parent's lifetime utility.

If utility were maximized without taking the bargaining in the second period into account, the model would be like that of the wealth model in the bequest literature and *Frankenstein*. If the second period bargaining model were solved without taking the parental influence from the first period into account, it is similar to the existing intrahousehold literature. One surprising result of including both perspectives will be the foresight effect, that under certain conditions, the parent's sense of foreboding that the child could gain too much power will

dampen the size of educational training that the parent bestows on the child relative to the other models.

2.3.1 Development of the second stage

To begin I analyze the second period, as is standard for two period games, when the child is grown and participating in the family's economic decision process.

Assume a cooperative bargaining framework for allocation between a parent (individual 1) and a child (individual 2). For simplicity we shall assume that there are no public goods, and each finds utility in his own consumption of private goods x_1 and x_2 . The utility functions are the same: $U' > 0$, $U'(0) = \infty$, and $U'' < 0$. Consumption, however is individual; the parent and the child only care about their unique consumable. The two engage in a cooperative bargaining exercise bound by the budget constraint of household income Y . The strength of the child's bargaining power is represented by θ , where $\theta \in [0, 1]$. Likewise the parent's bargaining strength is $1 - \theta$. Prices are assumed equal to one. In period two (the period analyzed here) Y and θ are given. However decisions in period one can affect Y and θ and thus will be influencing the outcome here.

$$\max_{x_1, x_2} (1 - \theta)U(x_1) + \theta U(x_2) \quad (2.1)$$

$$s.t. \ x_1 + x_2 \leq Y$$

$$FOC : \theta U'(Y - x_1) = (1 - \theta)U'(x_1) \quad (2.2)$$

The solution, $x_1^* = x_1(\theta, Y)$ and $x_2^* = x_2(\theta, Y)$. Note that when $\theta = 1$, we have the corner solution that all income is spent on x_2 . Likewise if $\theta = 0$, all is spent on x_1 . Furthermore, using the implicit function theorem on the FOC's, we can determine that the parent's second period consumption x_1^* is increasing in Y , and decreasing in θ .

$$\frac{dx_1^*}{dY} = \frac{\theta U''(Y - x_1^*)}{(1 - \theta)U''(x_1^*) + \theta U''(Y - x_1^*)} > 0 \quad (2.3)$$

$$\frac{dx_1^*}{d\theta} = \frac{U'(x_1^*) + U'(Y - x_1^*)}{(1 - \theta)U''(x_1^*) + \theta U''(Y - x_1^*)} < 0 \quad (2.4)$$

2.3.2 Parental Influence

Now let us assume that income Y in this second period has two components. One portion comes from the parent's prior savings s which has grown proportionately to the interest rate r . The other portion of family income is earned by the child: $w(e)$ is a return to educational attainment e . $w' > 0$ and $w'' < 0$. $Y(e, s, r) = s(1 + r) + w(e)$.

Furthermore, we shall also assume that the more education the child has, the more bargaining power he will have. θ is now a function of e . This will be partially due to confidence and self esteem that comes from higher earning capabilities and also to increased sense of superiority through academic snobbery. In some sense it captures the idea of a threat point contributing to bargaining power: the more educated the child, the easier for him to leave home to undertake life on his own.

Yet θ will also be influenced by how much income the parent has at present.

If the parent saved a lot or the interest rate is very high, he will have more power instead of the child. Thus $\theta = \theta(e, s, r)$. If $s = 0$, we assume the parent has no power: $\theta(e, 0, r) = 1$. $\frac{d\theta}{ds} < 0$ and $\frac{d\theta}{dr} < 0$. Also assume $\frac{d\theta}{de} > 0$ and $\frac{d^2\theta}{de^2} < 0$; $\theta(0, s, r) = 0$ and $\theta(\infty, s, r) = 1$. I allow for the concavity of θ in e since the parent has some innate power just from being a parent; a first loss of power is more easily relinquished than the last.

Even when the child is small, the parent foresees the future relationship between himself and his own child. (Perhaps the parent understands only too well, having been a child once himself.) He is in a conundrum. Should he choose to educate the child more, the parent can consume more since total family income rises. On the other hand, the child may get too big for his britches and take over the bargaining power in the household. If this were an isolated decision with savings given, without another period to consider, the parent solves this problem by maximizing $U(x_1^*(\theta(e, s, r), Y(e, s, r)))$ with respect to e . Since $U' > 0$, we can do the same by maximizing $x_1^*(\theta(e, s, r), Y(e, s, r))$ with respect to e . (This is not necessarily concave, however, so should multiple solutions arise, they must be checked to determine the global max.)

Using the FOC from the bargaining problem, more use of the implicit function theorem may help us determine the shape of $x_1^*(\theta(e, s, r), Y(e, s, r))$, when s and r are given.

The implicit function theorem gives us

$$\frac{dx_1^*}{de} = \frac{\frac{d\theta}{de}U'(s(1+r) + w(e) - x_1^*) + w'(e)\theta(e, s, r)U''(s(1+r) + w(e) - x_1^*) + \frac{d\theta}{de}U'(x_1^*)}{(1 - \theta(e, s, r))U''(x_1^*) + \theta(e, s, r)U''(s(1+r) + w(e) - x_1^*)} \quad (2.5)$$

To determine the shape it would be nice to examine the endpoints to simplify the function where $\theta=0$ or $e = 0$. Unfortunately this does not work without

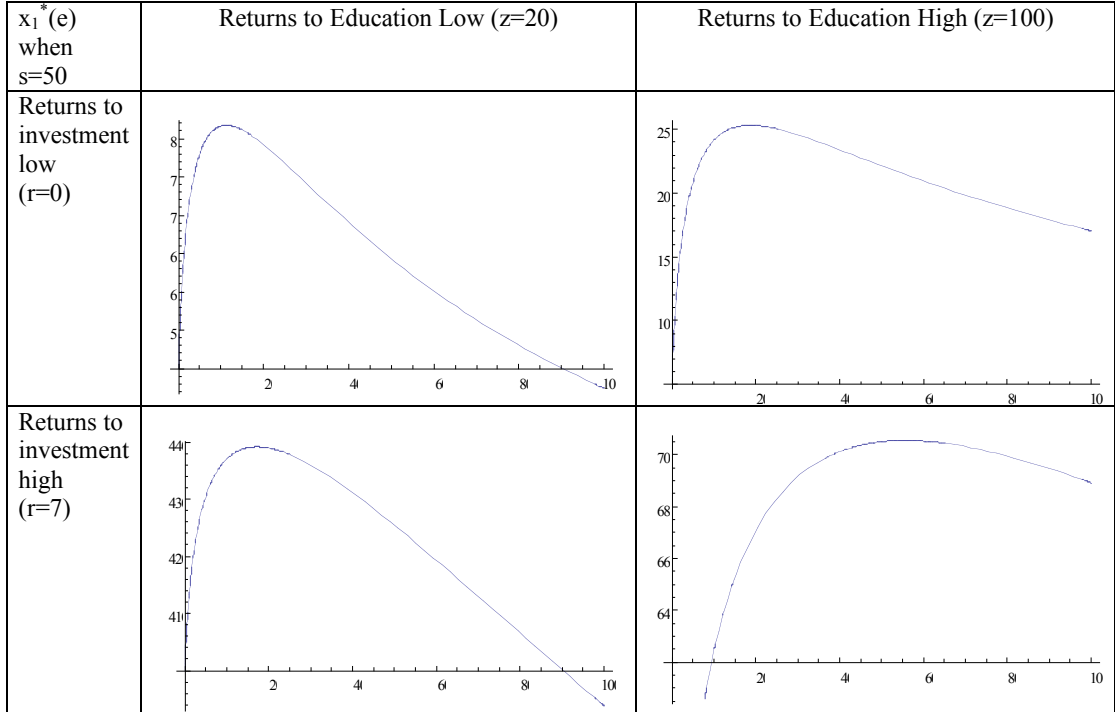


Figure 2.1: The shape of $x_1^*(e)$, parental consumption in period two, is concave due to the concavity of the wage function and is decreasing at larger values of e due to θ , the coefficient of power in the family. The more education the child has, the more income the family has, but a smaller portion goes to the parent.

knowing further derivatives since at the limit we have conflicting forces: take the last term $\frac{d\theta}{de} = U'(x_1^*)$. As $e \rightarrow \infty$, $\frac{d\theta}{de}$ goes to zero. Yet because the parent has no power, $x_1^* \rightarrow 0$, and $U'(x_1^*) \rightarrow \infty$. To determine which term ‘wins,’ we would need more information about the functional forms.

Let us instead examine a simple numerical example. Let $\theta = \frac{e}{e+(1+r)s}$, concave and increasing, meaning that $\frac{(1+r)s}{e+(1+r)s}$ is convex and decreasing. Let w be $zLn(e+1)$. z is a factor that scales the returns to education. Figure 2.1 shows $x_1(e)$ holding s constant at 50 and varying r and z . Other specifications of w and θ bring about similar shapes, although for a sufficiently small s or a large enough

base wage when $e = 0$ eliminated the hump; $x_1^*(e)$ was only decreasing in e . Intuitively, as education increases the child is gaining in earnings for the family, but the parent is also losing power. Furthermore, because earnings are concave in education, at some point the power the parent is losing is no longer offset by the gains in consumption.

2.3.3 Two Periods

The educational choice, however, is not actually so simple. Let us now consider the first period, when the parent must choose between private consumption x_o , personal savings s , as well as the amount of education e for the child. Furthermore there is a minimum amount c which must be spent on food for the child. Less than this and the child will die; the parent will be put in jail and have zero utility now and forever. Expenditure beyond c will improve the child's welfare and future wages; a healthier child makes for a more productive adult. To keep the model simple, though, we shall assume additional spending beyond c to be lumped into the variable e , since the effect in the second period is the same. Again for simplicity, we shall assume no benefit of education in the first period, it only accrues in the second period, which is the bargaining problem described above.

Limited by his period 1 income y , the parent will choose education e at price p , savings s , and first period consumption x_o to maximize lifetime utility, the sum of his utility from both periods.

$$\max_{x_o, e, s} U(x_o) + U(x_1^*(\theta(e, s, r), Y(e, s, r))) \quad (2.6)$$

$$s.t. x_o + pe + c + s \leq y$$

To simplify notation since c is a constant, the income can be normalized to $y_o = y - c$. It is also easy to see that $x_o = y_o - s - pe$ which can be substituted into the objective function and now we can maximize over e and s .

The FOCs:

$$pU'(y_o - s - pe) = U'(x_1^*(\theta(e, s, r), Y(e, s, r))) \frac{dx_1^*}{de} \quad (2.7)$$

$$U'(y_o - s - pe) = U'(x_1^*(\theta(e, s, r), Y(e, s, r))) \frac{dx_1^*}{ds} \quad (2.8)$$

The budget constraint holds with equality.

Claim 1: e^* is less than the e that solves $w'(e) = p(1 + r)$

Proof: In order for the system of equations to have a solution,

$$\frac{dx_1^*}{ds} = \frac{\frac{dx_1^*}{de}}{p} \quad (2.9)$$

Expanding, we get

$$(1 - \theta(e, s, r))[p(1 + r) - w'(e^*)] = Y(e, s, r)(p \frac{d\theta}{ds} - \frac{d\theta}{de}) \quad (2.10)$$

Since the right side is negative, thus must be the left side, implying $p(1 + r) - w'(e^*) < 0$. If the function w is such that $w'(e)$ is never greater than $p(1 + r)$, then there is no expenditure on education at all. This is not a surprise, since this condition is where the marginal family gain of savings equals the marginal family gain of education. Yet the parent only gains if the trade-off from giving up consumption by reducing savings is compensated by increased consumption from education. This increase is tempered by the loss of bargaining power, so the parent has no incentive to invest if returns to education are so low. This case is uninteresting, though, so from now on we shall assume that the expression $p(1 + r) - w'(e^*) < 0$ holds for at least some e .

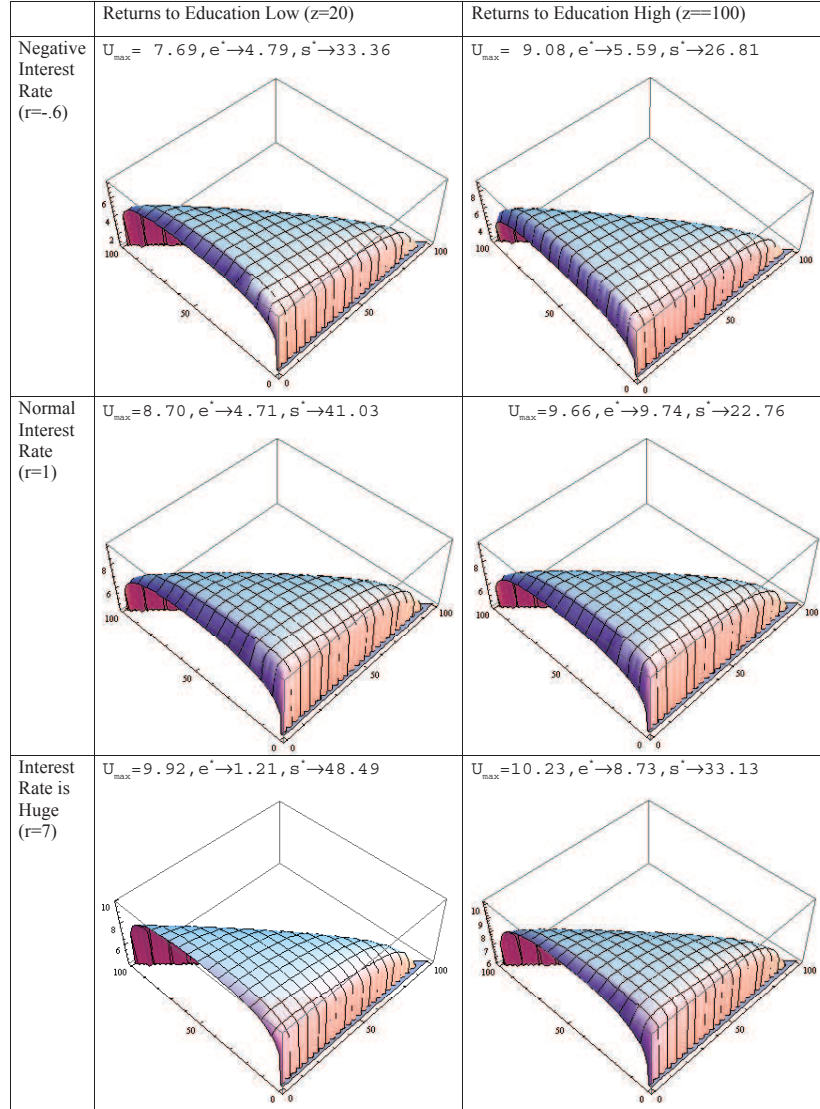


Figure 2.2: The Selfish Model: graphs of the parent's lifelong utility frontier under the selfish model with $p=1$ and income=100 with returns to education and returns to savings varied. $w = z \ln(e + 1)$ and $\theta = \frac{e}{e + (1+r)s}$. The left axes is savings and the right axes is education with the vertical axes utility. A negative interest rate is included in the chart to illustrate the strong effect of the power variable. Though we would suspect a parent would invest more in education since it allows for better returns, the loss in parental power due to loss in savings actually pushes the education choice lower. Less surprising, a higher return to savings also decreases the optimal level of education choice, while an increase in the returns to education increases the optimal level of education choice.

Claim 2: If $w'(e^*) > p(1 + r)$, then $s^* > 0$, $x_o^* > 0$.

Proof: We know that when $s = 0$, $\theta = 1$ and therefore $x_1 = 0$; the parent has no power, thus no consumption, in period two. Since the parent could have an infinite increase in utility from consuming a little instead of nothing, we know there is not a corner solution where $s = 0$. For the same reasoning, x_o^* must be positive. Could there be a solution where $e = 0$? This depends on the functional form of $x_1^*(e)$. As in all economic analysis, the solution is characterized by the condition that the marginal returns in period two consumption that accrue to the last dollar spent on education equal the returns of the last dollar saved.

$$\frac{dx_1^*}{ds} = \frac{\frac{dx_1^*}{de}}{p} \quad (2.11)$$

It is easy to see that $\frac{dx_1^*}{ds} > 0$ since $\frac{dx_1^*}{ds} = \frac{dx_1^*}{dY} \frac{dY}{ds} + \frac{dx_1^*}{d\theta} \frac{d\theta}{ds}$. In the first term, both are positive, and in the second, both are negative, making $\frac{dx_1^*}{de}$ positive. As we learned earlier, the form of $\frac{dx_1^*}{de}$ is not determinable from the generic equations, but the numeric example presented in Figure 2.1 shows that at zero $\frac{dx_1^*}{de}$ is positive, so a solution of $e=0$ is plausible.

2.4 A Bequest Model of Selflessness

Before incorporating generosity into our model, for symmetry let the selflessness model stand alone. In this case there is no bargaining in the second period because the parent is absent from the picture - either dead or so generous that the child can do whatever she wishes and no bargaining takes place. On the other side of the dichotomy from Gothic Frankenstein, our model of perfect

selfishness, is Daddy Warbucks from Little Orphan Annie, a model of generosity which we shall examine before complicating both to one of mixed selfishness and selflessness. (We have some clear intuition from the selfish model, and though summarizing the bequest model is not a contribution to the literature persay, we examine it in contrasting light in order to gain insight on how the generous factor will take affect when we incorporate it with selfishness in the mixed model.) After developing mutual affection, Annie agrees to be adopted. In the bequest literature, the child is not usually assumed a decision maker, and here I am stretching the analogy since Annie was rather spunky. However, it is safe to assume she had to study according to Daddy Warbucks' wishes. In this model, the parent is very well off or dies without ever having to be co-dependent with the child; both are the likely case of Daddy Warbucks since he is both extremely wealthy and quite old when he adopts Annie. Yet while alive, Annie is his complete source of happiness, and it is easy to imagine that he wants her to be happy after she dies, too; estate planning would be such that the child will have the largest wealth possible, a combination of her earnings and inheritance.

In the first period the parent maximizes his utility function which no longer consists of his own consumption, only the child's welfare represented by e (remember we had allowed this to absorb excess health and nutrition components above c). Since the parent is no longer alive in period two (or alive but still completely unselfish, only concerned with the child consuming as much as possible), bequest $b(e, s, r)$ would consist of the entire period two income, $s(1 + r) + w(e) = Y(e, s, r)$. Since there is no second period bargaining exercise, b is not a function of θ . For simplicity of comparison, we shall assume that the parent's utility $U(b)$ is the same form as $U(x_1)$ in my model; the budget constraint

is also the same.

$$\max_{e,s} U(e) + U(b(Y(e, s, r))) \quad (2.12)$$

$$s.t. pe + s \leq y_o$$

The solution will be \tilde{e} .

The FOCs:

$$U'(\tilde{e}) = [p(1 + r) - w'(\tilde{e})]U'((y - p\tilde{e})(1 + r) + w(\tilde{e})) \quad (2.13)$$

These give

$$1 + r = \frac{1}{p} \left[w'(\tilde{e}) + \frac{U'(\tilde{e})}{U'((y_o - p\tilde{e})(1 + r) + w(\tilde{e}))} \right] \quad (2.14)$$

This equation parallels Becker's wealth model where returns to education $w'(e)/p$ equal returns to savings $(1 + r)$, though here we have an extra term due to the intrinsic value the parent has placed on education. Furthermore, this equation has exactly the same interpretation as equation 2.9, and from this we can determine that the education level provided to a child is lower when there is a selfish parent and a bargained second stage than under the generous bequest scenario.

Theorem: $e^* < \tilde{e}$.

Proof: Equation 2.11 can be rewritten as

$$\frac{dx_1^*}{dY} \frac{dY}{ds} + \frac{dx_1^*}{d\theta} \frac{d\theta}{ds} = \frac{\frac{dx_1^*}{dY} \frac{dY}{de} + \frac{dx_1^*}{d\theta} \frac{d\theta}{de}}{p} \quad (2.15)$$

Since $\frac{dY}{ds} = 1 + r$ using 2.14 we can substitute into 2.15. Also note $\frac{dY}{de} = w'(e^*)$.

$$\frac{dx_1^*}{dY} \frac{1}{p} \left[w'(\tilde{e}) + \frac{U'(\tilde{e})}{U'((y - p\tilde{e})(1 + r) + w(\tilde{e}))} \right] + \frac{dx_1^*}{d\theta} \frac{d\theta}{ds} = \frac{\frac{dx_1^*}{dY} w'(e^*) + \frac{dx_1^*}{d\theta} \frac{d\theta}{de}}{p} \quad (2.16)$$

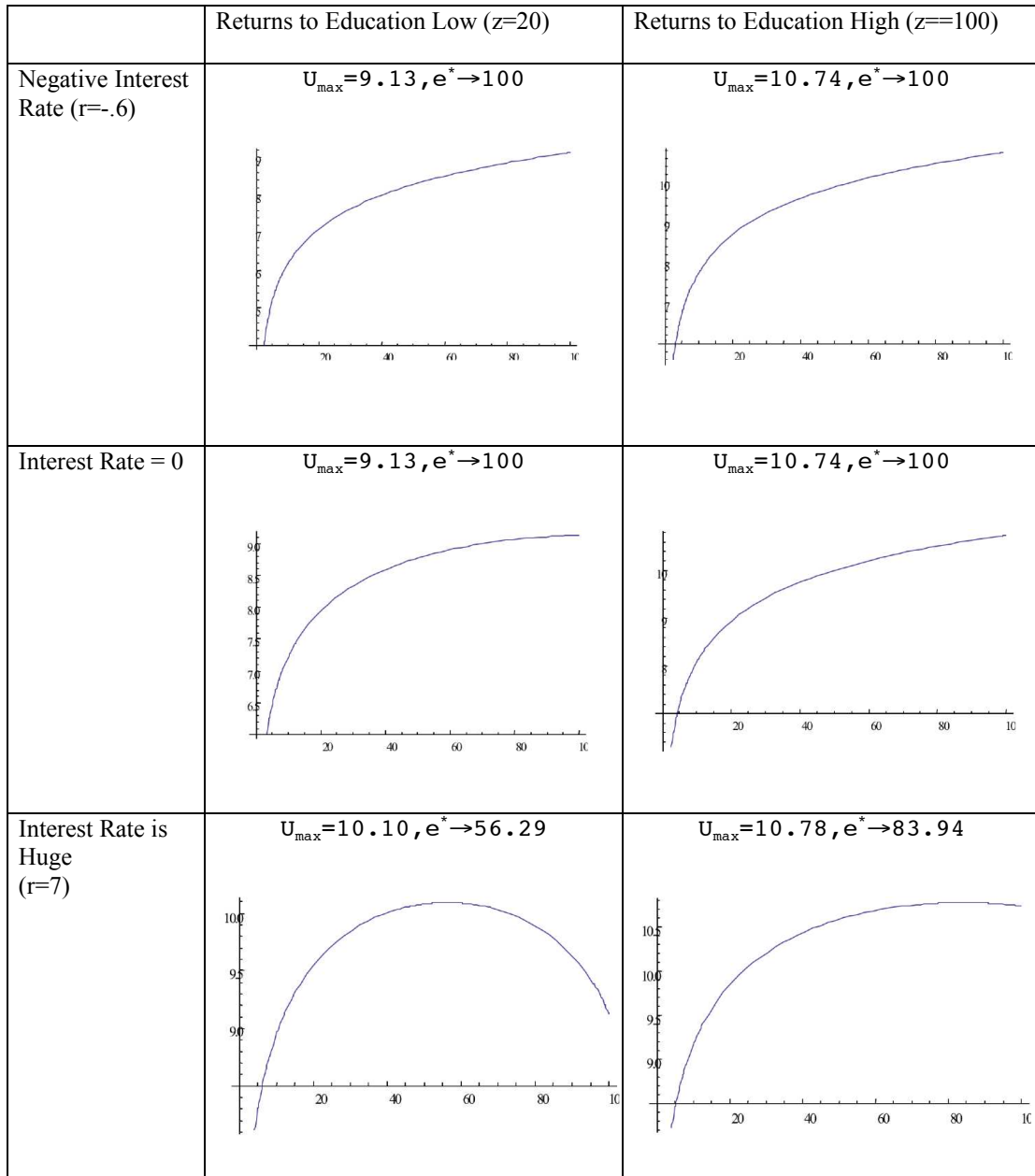


Figure 2.3: The Selfless Model. Graphs of the parental utility frontier using the same functional forms as the Selfish Model. With the parent uninterested in consumption for self, only education is needed to calculate utility; savings is $y-e$. With the extra emphasis on education and no concern for a power struggle nor parental consumption, optimal education levels much higher. When returns to education do better than the interest rate, the entire budget is devoted to education.

This simplifies to

$$\frac{U'(\tilde{e})}{U'((y - p\tilde{e})(1 + r) + w(\tilde{e}))} \frac{dx_1^*}{dY} + p \frac{dx_1^*}{d\theta} \frac{d\theta}{ds} - \frac{dx_1^*}{d\theta} \frac{d\theta}{de} = \frac{dx_1^*}{dY} [w'(e^*) - w'(\tilde{e})] \quad (2.17)$$

With the left side positive, and $\frac{dx_1^*}{dY} > 0$ this implies that $w'(e^*) > w'(\tilde{e})$. Since $w'' < 0$, we conclude that

$$e^* < \hat{e} \quad (2.18)$$

This result implies that education levels when a parent is expecting a bargaining exercise are lower than when a parent is perfectly altruistic; Daddy Warbucks would have been less generous had he been expecting to live longer. The altruistic parent maximizes consumption for his child, but the selfish parent maximizes consumption for himself, and has to limit education to reign in his child's bargaining power.

2.5 The Mixed Model: Selfishness and Selflessness

Finally we bring both selfishness and selflessness together into one model, allowing both parent and child to take on elements of each. While such a family is not a generalization of most families, it does compare to some. *The Gilmore Girls*, a popular television series, illustrates this type of relationship well. Lorelai had her daughter Rory when she was only 16 years old and raised her alone. Though Lorelai clearly wants the best for her daughter, sometimes the small age gap makes it seem that Rory is more mature than her mother. This family is a perfect example of a parent and child who live together and are amiable to each other, finding utility from the other's consumption *as well as* her own consumption.

To incorporate both aspects in the model we create a new function, a meta-utility function, which takes on these two components: the individual's utility as well as the utility of the other. The altruistic parameter we shall name α . If $\alpha \in [0, 1)$, the individual cares more about himself than the other. If $\alpha > 1$, the individual cares more about the other than himself. If $\alpha < 0$ he is antagonistic toward the other, but we shall not be so cynical in our view of the family, and rule out that case; for our purposes we shall require α to be positive. Person i 's meta-utility function now becomes $M_i(x_i, x_j) = U(x_i) + \alpha_i U(x_j)$. I am declaring meta-utility for notational convenience, not for philosophical reasons. Since we already delineated utility as U and used it in the prior two examples, to maintain the comparability of our results I do not want to introduce another term (x_j) as an argument of $U(x)$. Including $\alpha_i U(x_j)$ in the maximizer's objective function serves the same mathematical purpose and allows for parallels in our analyses which help us better understand the results.

This analysis will follow the same structure used to discuss the selfish model, but now with the altruistic component. We start with the second period, weighting the meta-utility functions by θ . After grouping terms, the cooperative bargaining problem becomes

$$\max_{x_1, x_2} (1 - \theta + \theta\alpha_2)U(x_1) + (\alpha_1 + \theta - \theta\alpha_1)U(x_2) \quad (2.19)$$

$$s.t. \ x_1 + x_2 \leq Y$$

To distinguish the results of this model from the others, this solution will have "hats:" $\hat{x}_i(\theta(e, s, r), Y(e, s, r), \alpha_1, \alpha_2)$. The parent's period two consumption is now also decreasing in α_1 and increasing in α_2 , as the implicit function theorem

gives us from the FOCs:

$$\frac{d\hat{x}_1}{d\alpha_1} = \frac{(1 - \theta)U'(Y - \hat{x}_1)}{(1 - \theta + \theta\alpha_2)U''(\hat{x}_1) + (\alpha_1 + \theta - \theta\alpha_1)U''(Y - \hat{x}_1)} < 0 \quad (2.20)$$

$$\frac{d\hat{x}_1}{d\alpha_2} = \frac{-(\theta)U'(\hat{x}_1)}{(1 - \theta + \theta\alpha_2)U''(\hat{x}_1) + (\alpha_1 + \theta - \theta\alpha_1)U''(Y - \hat{x}_1)} > 0 \quad (2.21)$$

Our specifications regarding the second period Y and θ remain the same as the selfish model. And $\frac{d\hat{x}_1}{dY}$ and $\frac{d\hat{x}_1}{d\theta}$ have the same signs as $\frac{x_1^*}{dY}$ and $\frac{x_1^*}{d\theta}$. Yet altruism that the parent has for the child as well as what he expects from the child, α_2 , have an ameliorating effect. Also note that as in the selfish model, $\frac{d\hat{x}_1}{ds} > 0$ since $\frac{d\hat{x}_1}{ds} = \frac{d\hat{x}_1}{dY} \frac{dY}{ds} + \frac{d\hat{x}_1}{d\theta} \frac{d\theta}{ds}$

Let us now introduce the first period choice into the model. Limited by his period 1 income y , the parent will choose education e at price p , savings s , and first period consumption x_o to maximize lifetime utility, the sum of his utility from both periods. Recall that we are also including e as an altruistic element in the first period.

$$\max_{e,s,x_o} U(x_o) + \alpha_1 U(e) + U(\hat{x}_1[\theta(e, s, r), Y(e, s, r), \alpha_1, \alpha_2]) + \alpha_1 U(Y(e, s, r)) - \quad (2.22)$$

$$\hat{x}_1[\theta(e, s, r), Y(e, s, r), \alpha_1, \alpha_2]) \text{ s.t. } x_o + pe + c + s \leq y$$

Note that the objective function is the selfish maximization problem (2.6) and α_1 multiplied by the altruistic maximization problem (2.12). The only detail that keeps this from being an exact parallel is that x_2 is dependent on θ , $\alpha_1 U(x_2)$; in the bequest model no power struggle is taking place. So can we conclude that this \hat{e} will fall between e^* and \tilde{e} ? This is what we shall next discuss.

The FOCs give a characteristic equation¹

¹ Y and θ are implicit functions of e, s , and r . They have been left implicit due to space.

$$\alpha_1 U'(e) + U'(\hat{x}_1(\theta, Y, \alpha_1, \alpha_2)) \frac{d\hat{x}_1}{de} + \alpha_1 U'(Y - \hat{x}_1(\theta, Y, \alpha_1, \alpha_2))(w'(e) - \frac{d\hat{x}_1}{de}) \quad (2.23)$$

$$= p[U'(\hat{x}_1(\theta, Y, \alpha_1, \alpha_2)) \frac{d\hat{x}_1}{ds} + \alpha_1 U'(Y - \hat{x}_1(\theta, Y, \alpha_1, \alpha_2))(1 + r - \frac{d\hat{x}_1}{ds})]$$

These likewise give us a characteristic equation by which the last dollar spent on education gives the same benefit as the last dollar saved. However, due to our complex model, this benefit accrues in many different ways. The parent gains benefit from education by spending in on education in the first period, which increases personal consumption for both in the second period, another source of utility, yet the increase in child's consumption in period two is also a limiting factor of his own consumption, so the total marginal utility is tempered in that regard. The same is true for savings, though the parent has no intrinsic delight from savings; it is only the income from savings in period two that allow him utility. Unlike the selfish model, the educational choice can never be zero, due to the altruism in the first period. Figure 2.4 illustrates how the results change when the parameters of altruism change.

Again, using the fact that $1+r$ appears in all characteristic equations we can substitute in to equations 2.9 and 2.14 to see how \hat{e} relates. First comparing \hat{e} and e^* , the solution to the selfish model, results in:

$$\frac{\frac{1}{p}\alpha_1 U'(\hat{e}) + [\frac{1}{p}\frac{d\hat{x}_1}{d\theta}\frac{d\theta}{de} - \frac{d\hat{x}_1}{d\theta}\frac{d\theta}{ds}][U'(\hat{x}_1) - \alpha_1 U'(Y - \hat{x}_1)]}{U'(\hat{x}_1)\frac{d\hat{x}_1}{dY} + (1 - \frac{d\hat{x}_1}{dY})\alpha_1 U'(Y - \hat{x}_1)} - \frac{\frac{1}{p}\frac{dx_1^*}{d\theta}\frac{d\theta}{de} - \frac{dx_1^*}{d\theta}\frac{d\theta}{ds}}{\frac{dx_1^*}{dY}} = \quad (2.24)$$

$$\frac{1}{p}[w'(e^*) - w'(\hat{e})]$$

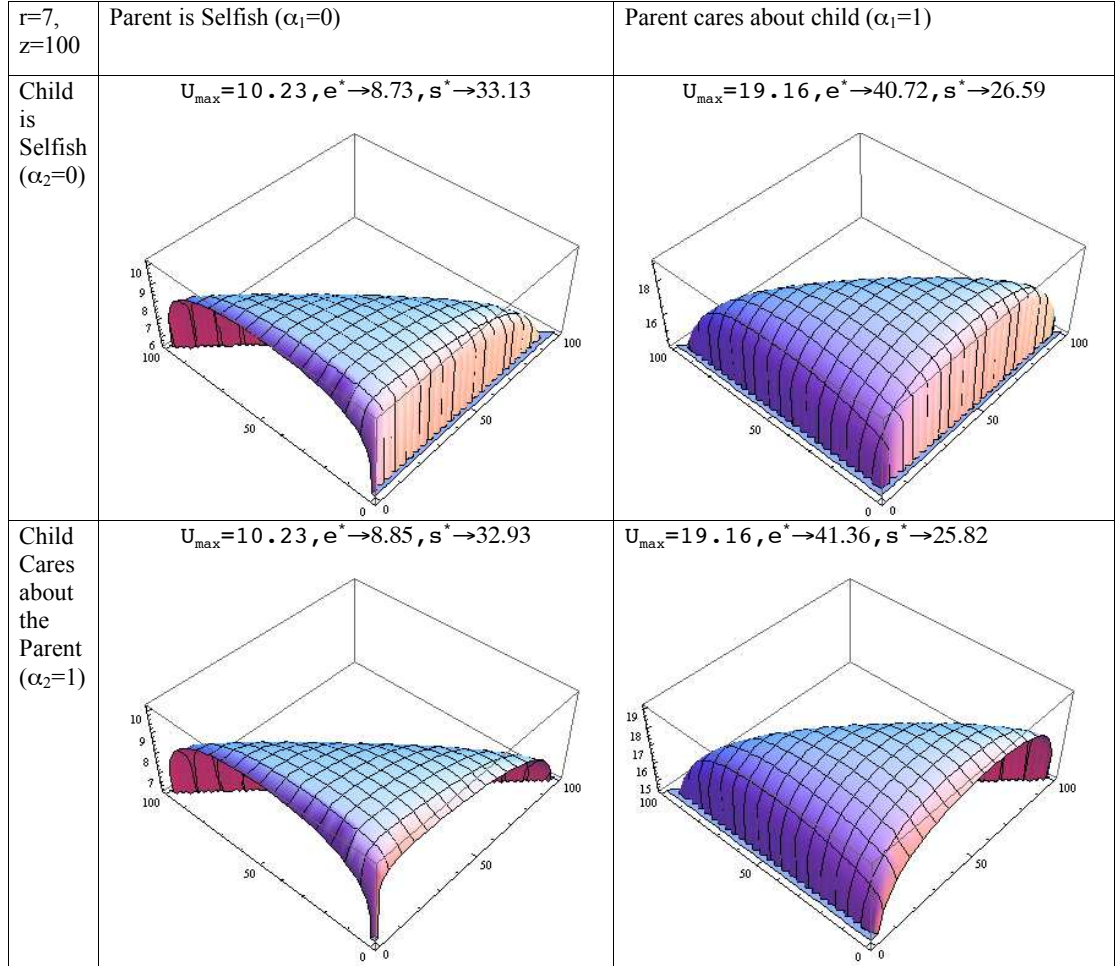


Figure 2.4: When the parent cares about the child, educational outcomes improve. When the child cares about the parent, educational outcomes also improve (though to a much smaller degree as this factor enters less prominently in the parent's objective function) since the parent does not have to invest so much into keeping up consumption through maintaining a balance of power.

Unlike in our previous analysis, we cannot determine that the left side of the equation is positive, which would indicate that $e^* < \hat{e}$. We can determine the signs of the individual components, however, $\frac{d\hat{x}_1}{dY}$ can never be more than one due to the price having been normalized to one. From our first order conditions in the second stage, we can conclude that $U'(\hat{x}_1) - \alpha_1 U'(Y - \hat{x}_1) > 0$ because $\alpha_1 < \frac{\alpha_1 + \theta - \theta\alpha_1}{1 - \theta + \theta\alpha_2} = \frac{U'(\hat{x}_1)}{U'(Y - \hat{x}_1)}$. Since the α 's are less than 1, $1 - \theta + \theta\alpha_2 < 1$ and $\theta - \theta\alpha_1 > 0$. The other signs we have already discussed, leaving everything positive on the left hand side except the term $\frac{1}{p} \frac{d\hat{x}_1}{d\theta} \frac{d\theta}{de} - \frac{d\hat{x}_1}{d\theta} \frac{d\theta}{ds}$. This result means we cannot yet say with certainty that adding in altruism to selfishness will increase educational attainment.

We have the same difficulty when we compare the results of the mixed model with those of the altruistic model:

$$\frac{\frac{1}{p}\alpha_1 U'(e) + [\frac{1}{p} \frac{d\hat{x}_1}{d\theta} \frac{d\theta}{de} - \frac{d\hat{x}_1}{d\theta} \frac{d\theta}{ds}][U'(\hat{x}_1) - \alpha_1 U'(Y - \hat{x}_1)]}{U'(\hat{x}_1) \frac{d\hat{x}_1}{dY} + (1 - \frac{d\hat{x}_1}{dY})\alpha_1 U'(Y - \hat{x}_1)} - \frac{1}{p} \frac{U'(\tilde{e})}{U'[(y_o - p\tilde{e})(1 + r) + w(\tilde{e})]} = \quad (2.25)$$

$$\frac{1}{p}[w'(\tilde{e}) - w'(\hat{e})]$$

The left hand side is negative if $\frac{1}{p}\alpha_1 U'(\hat{e})$ is sufficiently small and would imply that $\tilde{e} > \hat{e}$, but lacking magnitudes, we cannot claim this in the theoretical case.

Still, by reflecting on these equations further we can learn a bit more about this mixed solution \hat{e} . The first term in both equations 2.24 and 2.25 is the same. Returning to manipulate the characteristic equation (2.23) of the mixed model, we learn that this term is positive when

$$1 + r > \frac{w'(\hat{e})}{p} \quad (2.26)$$

and negative when the sign is reversed. This inequality recalls the monetary cost-benefit analysis of education. One invests up to the point that wages resulting from education are equal to the savings rate. According to purely monetary considerations, the altruistic model over-invests in education and the selfish model under-invests. Under different parameters or functional forms, the sign of equation 2.26 can reverse, so the mixed model is the only one which contains the possibility of actually arriving at the “efficient” result in monetary terms. A parent who neither worships nor fears his child is preferred in this regard (and there are probably psychological grounds upon which we would prefer this as well).

Since this mixed model is so difficult to solve, it would be nice if we could declare the solutions to the simpler selfish and selfless models as upper and lower bounds. Though we have seen that this cannot be established from comparative statics, Figure 2.5 is a numerical example that illustrates the outcomes, contrasting them to the selfish and selfless models.

2.6 Migration: Introducing the Threat Point

Most bargaining literature considers the possibility of exiting. I shall sketch out this option conceptually, but only discuss intuitively, since we have complicated the math enough. We shall allow the child an exit option, as is usually available for children; many eventually stop living with their parents. This exit option will parallel the concept of a threat point in the bargaining literature. In the-

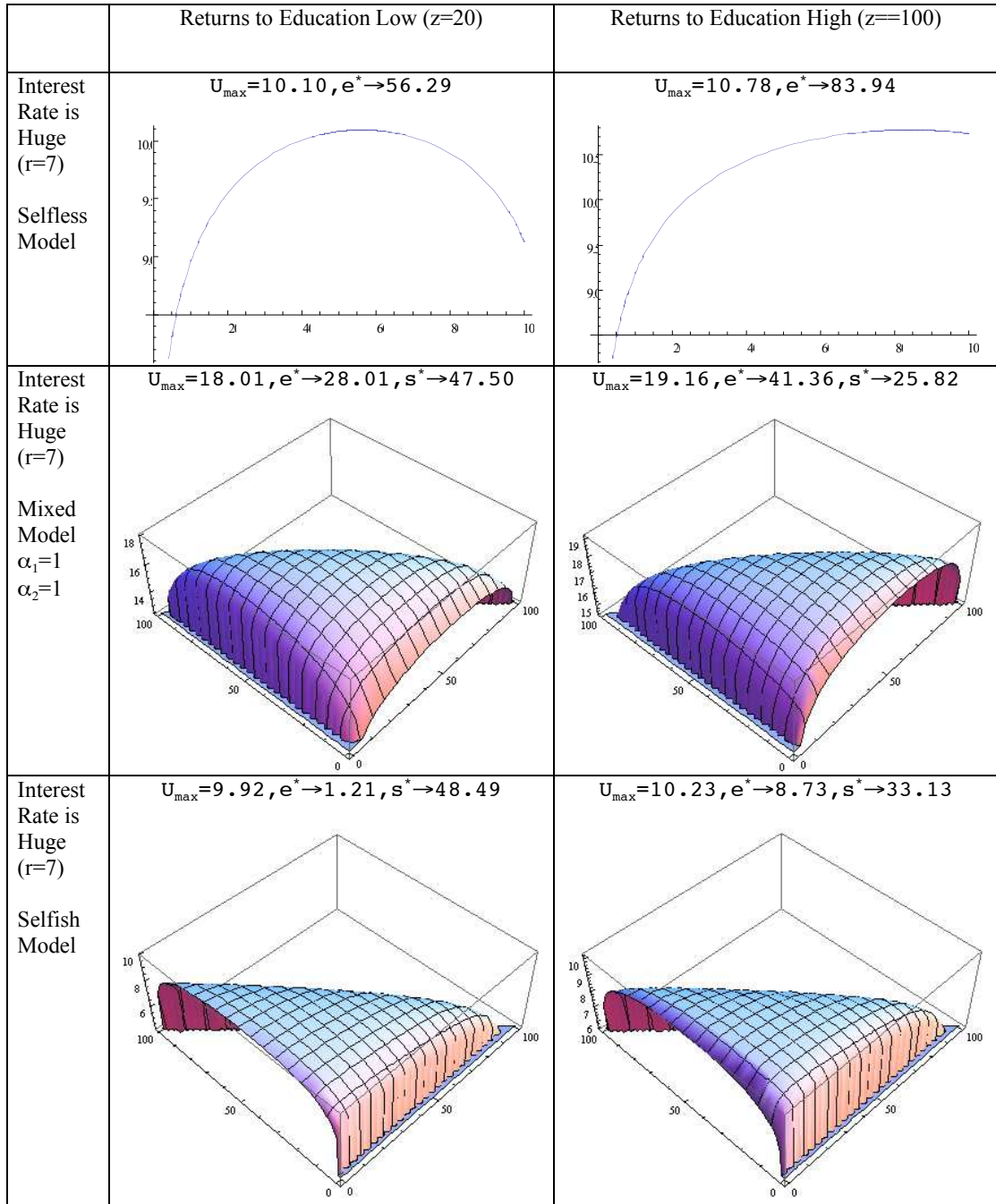


Figure 2.5: Comparing the mixed model with the selfish and selfless models: the mixed model is an intermediate result.

ory, separation does not occur because the pair can always do better by staying together. Here, however, exiting will be feasible because wages may be higher elsewhere and this extra pay can only be accessible by moving. Also within the literature both parties have threat points, but here we just consider the child's exiting option due to the two-stage nature of the game. The parent does not need to consider exiting because he is the one who determines the equilibrium. While the parent would indeed have some utility from separation as we shall see, it will not be salient for the separation decision since the parent is the mastermind who drives the outcome toward that which he shall ultimately prefer. Only the child's exit option may be binding.

The child shall move to the city if his consumption as a city dweller is higher than if he stayed home with his parent. Unfortunately, living in the city results in higher expenses, like renting an apartment, but comes with higher income. He will move if this city consumption is larger than what he gets at home. The parent is left with utility $(1 + r)s$. The reverse of the previous inequality becomes another constraint on the parent's maximization problem. Without remittances, the parent will never wish for the child to move out. The maximum value of $(1 + r)s$ is found when $e=0$. The parent can always do better, as we saw earlier in the selfish model, if he educates the child. Yet with this new constraint, education levels may be held even lower. In the extreme, under the selfish model, the parent may just choose not to educate the child at all! The fear of migration and losing the investment in education overwhelms the parent and as a result no education is provided for the child.

Fortunately this would never happen in the other selfless or mixed model due to the intrinsic utility derived from education. What is more likely is that

each consumes his income privately, yet there are remittances from child to parent. α_2 again will be the coefficient of concern of child for parent, now based on reciprocity. If the child has had much education he will be appreciative and support the parent, at least this is what the parent expects.² The problem with this specification is that there is no presentiment of a power struggle within the home; savings can be zero, implying much higher levels of education are feasible. This takes us full circle to an expectation of no bargaining, which is the precise scenario we are moving away from. If the parent is going to consider this to be a likely case, he must still consider the other scenario as feasible. Perhaps a weighted average of the two in the objective function would reconcile these diverse outcomes. Otherwise having this naive expectation can backfire, as Frankenstein learned. Frankenstein formed his monster with the strongest, most handsome body parts he could glean from the morgues, imagining that his creation would be more perfect than any natural-born human. The result was the opposite, more hideous than imagined. Blind expectation of an ideal outcome is unwise and a wary parent may balance this with the possibility that the child stays at home, in as weighted average of the two outcomes. There is no need to discuss this further, as we have already seen how the presence of the power variable tempers the educational attainment of the child.

2.7 Conclusion

Due to the inherent endogeneity of bargaining power between parents and children, this relationship deserves special attention that pre-existing models of

²My brother tells stories of the parents of an Indian friend buying their son a fancy sports car to bribe (guilt?) him into supporting them in old age. Not exactly an investment in education, but an investment, none the less.

intra-household bargaining typically do not allow for. In a marriage model, even if the husband is similarly restricting a wife's earning potential to maintain his power, there is always some sort of reservation utility entitling the wife to a small bit of say. And if not, then we are in a dictator model, where the husband completely dominates his wife and she has no chance of ever participating in the bargaining process. The parent-child relationship is more dynamic, consisting of two phases. At the beginning the child is always dependent on the parent to make decisions; at some point the child's bargaining power is purely null. Later, as he grows, he is able to participate in family life. This work has addressed this special situation with a comprehensive model considering the two different periods a family experiences.

This two stage model of parent-child bargaining takes into account that the parent is allowed to choose the child's level of education and in essence has determinism over the bargaining power in the second period. It considers the duplicity of human nature, that parents and children are self-interested and selfless. A self-interested parent limits a child's education to maintain control over consumption in the future while a selfless parent will have a higher level of education investment in the child. Comparing contrasting models of a selfish family to a selfless parent illustrates how the factors play out in a more realistic but more complex model. While we arrive at a similar conclusion that the returns to education will equal the returns to savings for the parent, and may be monetarily efficient in this mixed model, the process by which we arrived at this conclusion introduces a more thorough and dynamic method of thinking about the relationship than either the intra-household literature or the bequest literature offers. Future work will benefit from such a structure: this work is a stepping-stone for future models of more complex families.

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CHAPTER 3

**TEENAGE MOTHERS AND THEIR MOTHERS: INTERGENERATIONAL
INTRA-HOUSEHOLD ALLOCATION IN SALVADOR, BRAZIL**

3.1 Introduction

At a social agency in Northeast Brazil, I chatted with a group of children who were drawing pictures of their families. The bright colors and undeveloped technique were to be greeting cards for fund raising in Italy. I asked a girl to tell me about the stick figures looming over a peaked roof house with an apple tree (a scene strangely uncharacteristic for Brazilian favelas) and I was taken aback when she pointed out her daughter. The social worker later explained that in such circumstances the teenager's mother ends up caring for the child since adolescent mothers have little experience. Though I was surprised by the identity of the figures in the drawing, many Brazilians would not be: the most recent statistics indicate that one fifth of all births in Brazil were to women under the age of twenty (UN 2007). This has not always been the case. The trend of teenage motherhood increased from 12% of births to nearly 19% from 1986 to 1996 (Gupta and da Costa Leite 1999), reached a peak in 2001 at 21%, and since has not dropped below 20% (UN).¹ Though teenage motherhood is not desirable from health and education perspectives, its prevalence and persistence indicate that it is a social problem not easily solved; policy must address the issues associated with the trend.

The household composition associated with teenage motherhood has also

¹This data corresponds to the demographic story told by NGO leaders I met in Salvador, though they imply that the increase in teenage mothers in the neighborhood is more recent.

changed. In Brazil, a teen pregnancy would traditionally result in the daughter leaving her family to live with the baby's father. Now days, however, teen pregnancy is more accepted by mothers and they allow their daughters to live at home (anecdotal). Though this demographic shift would be a fascinating topic in and of itself, my study addresses the present relationships between these young mothers who live with their mothers. Are their interactions characterized by conflicts or cooperation, and do these dynamics have repercussions for the baby?

Sociologists have addressed several questions around this family structure. Apfel and Seitz look at different ways inner-city grandmothers and teenage mothers relate in the United States, and indicate that in the majority of the black families they surveyed the grandmother assisted the mother in her parenting; much less frequently was the teenager the sole care-giver or did the grandmother take over all the parenting duties (1991). Grandmother support may be limited strategically, as Hotz, McElroy, and Sanders show that grandparents give less in financial transfers to teenage mothers who have a younger sister than to those who do not have a younger sister, to discourage the younger sister from repeating the event (2005). This restraint, however, brings up concerns for the infants' well being. Emotional support from grandparents is correlated with teen mothers behaving more nurturally toward their children than teen mothers without this family structure (Oyserman, Radin, and Saltz 1994). This positive effect on behavior is important because, in the United States at least, teenage mothers are less nurturing than their elder counterparts. Perhaps for this reason, children of teenage mothers fare worse than others academically and tend to repeat the fertility trends of their parents (Card 1981); a grandparent presence may help to temper these unfortunate results.

My study likewise addresses the issue of family structure and child welfare among families who have a teen mother living with her mother in Salvador, Brazil. The repercussions affecting an additional generation's welfare make understanding the nature of the relationship between teens and their mothers particularly important. Differing preferences for the baby's well-being and relative bargaining power in allocative consumption decisions could have significant impacts on the child's development. Since there are two factors influencing this outcome, my research questions are twofold: The first is to determine which model of intrahousehold bargaining characterizes the relationship between teenage mothers and their mothers: unitary, collective, or neither. The unitary model implies bargaining is not happening, while the collective model implies cooperative bargaining with a Pareto optimal outcome. The second question is to explore the women's relationship with the child: is either of the two willing to pay more for the child's wellbeing? Two experiments and an accompanying household survey, all directed toward understanding intrahousehold decision making, were applied to 152 families enrolled in the NGO Pastoral da Criança in Salvador, Brazil. A trust game tested for Pareto efficiency in income maximization for each family. I also designed a game to see if there were differences in valuations of a child development toy as well as whose valuation dominated in a bargaining setting; varying the endowment between mother and daughter can reveal evidence of bargaining at the population level. The game outcomes indicate that though most families did not reach Pareto optimality, generosity is the norm. There is little evidence of bargaining, but we do find that members of Pareto efficient families had significantly lower valuations for a child development toy than family members from non-efficient families. In the majority of families, however, the behavior in the two games did not align with

results predicted from standard models. Results offer insight to Bolsa Familia, Brazil's conditional cash transfer program aimed at improving child welfare.

Economists have long since taken up the question of intrahousehold allocation to analyze children's welfare. Duncan Thomas, in one of the first articles rejecting the unitary model in Brazil, finds improvements in the nutritional consumption of children when their mother receives unearned income (1990). The literature has continued in this tradition, with many analyses taking advantage of conditional cash transfer programs as exogenous shocks impacting consumption (discussed in section 2). Recently a few articles have touched on the intergenerational aspect of intrahousehold bargaining. These consider the presence of a grandparent with a pension in the household and determine if the pension recipient is participating in the bargaining process and affecting child welfare (Duflo 2003; Ponczek 2007). Most continue to make the gender comparison: are grandfathers or grandmothers more concerned about child welfare? While my question is indeed intergenerational, it is not inter-"genderational". Instead of having a man who likes alcohol and a woman with a strong preference for child welfare, we have two women both with vested interest in the child (we hope!). The bargaining dynamics will be quite different from the other families explored in the economic literature.

Most intra-household studies require the presence of an exogenous income shock to determine bargaining models. If private consumption patterns change when one person receives more income, we can conclude bargaining is taking place. While much of this population receives money from the social welfare program Bolsa Familia, this transfer is not exogenous since it was implemented in 2003. To get around this challenge, the bargaining game simulates

such events on a small scale. Coupled with a trust game, the results reveal how the family operates. I have strategically selected two complementary games to illustrate the key aspects of household dynamics.

The teenage mothers and their mothers also responded to a household survey. Descriptive statistics confirm a lack of exogeneity in income, so the experimental data and psychological survey questions become an even more important source of insight. In providing both revealed economic preferences through the games as well as reported behavior and opinions, this interdisciplinary approach builds more complete understanding.

My results suggest that on average these families are fairly cooperative, with mother and grandmother sharing similar concern for the baby, but the teenage mother retains the role as principal caretaker. There are implicit policy implications relating to Brazil's conditional cash transfer program Bolsa Familia. The conclusions imply that there is no need to target the teen mother with the stipend, even though she is closer genetically and is delegated more responsibility for her child. However, as other authors wisely conclude, I, too, refrain from making a "one-size-fits-all" generalization as we find much variation among families as well as results un-categorizable within the predictions of standard models (Iversen et. al. 2009).

3.2 Theoretical Framework

There are several competing models under which a family may operate when engaging in household decision making. Each has its own characteristics as well as policy implications for targeted cash transfer programs or other social

interventions. The games, which shall later be described in detail, test two main hypotheses relating to intrahousehold behavior as highlighted in these models. The first experiment is a trust game testing Pareto optimality adapted from Iversen et. al. (2009). The second makes use of a Becker–deGroot–Marschak mechanism to examine if valuations for a child development toy change when the owner of the income changes. Using the results of these two games, in addition to being able to classify some individual families, we can determine under which model a representative family may function and use this understanding as a basis for policy suggestions. I first discuss the alternative models and then explain the characteristics the games exploit to identify under which model the families operate, covering the general concepts and intuitive results of each model. I limit the discussion to one parent, since Brazil tends to be matriarchal: 31% of Brazilian families are headed by single women, and in my sample this figure is almost double (IBGE 2006).

Since we are dealing with parents and children, it is safe to assume that at one point in time the parent was making the decisions for the family. The unitary model holds if the parent remains in this dictatorial role now that the teen is grown, or if teen and parent are in such agreement that preferences are in consensus. Since consumption decisions are made with only one utility function, Pareto efficiency is a characteristic of this family. When considering opportunities to increase family income in the parent-child context, the Rotten Kid theorem explains how a Pareto optimal outcome could arise. Even though a child is self-interested, since the parent is making final decisions regarding income distribution for the household the child still finds it in his best interests to maximize total family income.² This also implies that no matter who is earn-

²Bergstrom finds a class of utility functions for which this does not hold and the child would not maximize income. Without transferrable utility, a child can manipulate the utility possibil-

ing income within the family, consumption decisions remain constant, aligning with the dictator's preferences. Given constant total income, there will be no reward for a family member who earns more than the others; likewise if the dictator suddenly earns less and the others more, all will still consume exactly as before. With regard to policy, a targeted cash transfer would have no impact in a family operating under the unitary model. To summarize, Pareto efficiency and constant consumption decisions across different income patterns will be the expected observed behavior for the unitary model.

If a family operates under a bargaining model, negotiation between members allows them to arrive at consumption decisions. The literature on husbands and wives suggest that most households bargain,³ and there is even some evidence that children and parents also engage in bargaining. Iversen reports that some adolescent boys in India pressure their parents to allow them to migrate (2002). Berry finds varying results in child reading outcomes when an incentive is directed toward a parent or a child (2009). The source of power in these negotiations has been a subject of much discussion (see Agarawal, 1997), but for economic purposes I focus on income, as I am examining this topic in light of a targeted cash transfer. When a family member has more income she has more say over how to spend it. Thus when the distribution of income is altered through a transfer, the recipient spends more on herself, disproportionate as to how prior income was used. This experimental outcome is predicted for both types of bargaining models as long as income is a determinant of bargaining power.

Bargaining models can be categorized based on efficiency. By definition,

ities frontier in his favor. However, I do not include these with my definition of the unitary model, as the result falls well outside of the spirit of being "unitary." (1989)

³see Alderman et. al. (1995) for a full discussion

households are collective (cooperative) if efficiency is realized⁴ (Bourguignon, Browning, and Chiappori, 2009). Non-cooperative families still hold potential for an increase in utility without making anyone any worse off. In household analysis of married couples, Lundberg and Pollack (1993) and Carter and Katz (1997) suggest that inefficiency results when two individuals operate in separate spheres: with the division of labor between men's work and women's work, some gains from comparative advantages are missed. Udry has found evidence against Pareto Optimality for farming couples in Uganda, again based on divisions of men's crops and women's crops (1996). Experimentally, Iversen also rejects cooperation to a certain degree in that surplus maximization is not always realized when couples in Uganda play a dictator game (2009). Yet these analyses are about relationships between different genders. We may find that women are more cooperative regarding childcare in the family. If Pareto optimality is found not to hold, some social work encouraging cooperation may be the appropriate policy response due to the concern that transfer money is not used efficiently.

The predictions of the models with the experiments are summarized in the quadrants below:

		Trust Game	
Outcomes		P. Efficiency	P. Inefficiency
Book	Bargaining	Collective	Non-Coop.
Game	No Bargaining	Unitary	<i>Unexpected</i>

⁴Basu (2006) has shown that inter-temporarily this is not necessarily true: if earned income is a factor of bargaining power, one member may limit earnings of another so as not to lose future power. Yet again, this behavior is hardly in the spirit of "cooperative" so I shall not consider it to be so in this definition.

Classic intrahousehold analysis rejects the unitary model if the consumption of private goods change when exogenous private income changes (Browning et al 1994). To confirm that the family maintains Pareto efficiency, a more complicated test checks that ratios of the marginal propensities to consume a good with respect to the income of both spouses, at a constant family income, are the same across goods (Bourguignon et al 1993). Only recently has methodology developed to include simpler test of Pareto optimality, and even then these techniques are feasible only when two distribution factors (power variables influencing how decisions are made) are observed (Bourguignon, Browning, and Chiappori, 2009). Unfortunately not every data set of consumption goods and income will be appropriate for these techniques. Typical categories of private goods are men and women's clothing. Yet because my population of interest is women, we cannot discern between clothing use when this category is considered. I confirm that many families indeed share clothes, likely out of necessity, indicating that poverty may confound supposed observations of private goods. Furthermore, it is difficult to make a case that income is exogenous unless it comes from an external shock and there is an absence of selection bias. Finally, distribution factors are likewise not necessarily exogenous; my theoretical work illustrates how a parent's choices when the child is young may influence the future bargaining power of a child (Reynolds, 2010). Yet since the principle behind the empirical technique that rejects the unitary model is an inspiration for experimental design, I continue the discussion as a reference for contrasts and similarities to my experimental methodology.

To test if a bargained model prevails in the household, economists use sur-

vey data on individually consumable goods and determine if a constant proportion of income is spent on a good no matter who earns the income (implying the unitary model), or if the proportion of income spent on a good fluctuates with respect to who is bringing in more wealth to the family (implying the collective model, or a non-cooperative model) (Browning et al 1994). It is this principle which is the motivation for the experiment which tests a change in consumptive behavior arising from a change in income. While the experiment is a contrived scenario, it is designed to parallel this standard statistical analysis.

The challenge for the researcher is establishing the exogeneity of the earnings. While one family member may be earning more, this may be the result of bargaining itself: perhaps one member takes advantage of the other by forcing her to work. Thus sudden changes in policy or income shocks can be advantageous to this analysis. The data has been often associated with natural experiments to ensure exogeneity. Legal changes in transfers is the obvious choice: the sudden, unexpected shift or increase in income to a certain group is precisely the type of exogenous income needed to analyze the bargaining model. These analyses of natural experiments have been applied to changes in cash transfer programs around the world (Oportunidades (Bobonis 2004), Bolsa Familia (Braido et. al. 2009), Romanian and British child allowances (Sahn and Gerstle 2004) (Lundberg et. al. 1997) among others). Since I find no such shocks available (nor have the funds to implement such a shock), I employ experimental methodology to simulate such an event. In addition, the trust game sheds light on the efficiency of the family.

3.3 Experimental Design

Experimental games have long helped economists better understand family dynamics. Corfman and Lehmann find couples' behavior to be cooperative in decision making; preference intensity is a stronger predictor of the decision made than bargaining power (1987). Bateman and Munro performed an experiment on household behavior, finding that individual lottery preferences are similar to the couple's joint lottery preferences (2005). Berry also used a field experiment in India to determine that parents and children bargain over a child's educational behaviors (2009). Ashraf looks at husband and wife banking in the Philippines to find that expenditure choices differ whether actions are public or private (2009). Iversen et. al. uses the dictator and trust games with variations in payoffs in Uganda to test intrahousehold bargaining models between husbands and wives and he rejects any one model as dominant (2009). Hoffmann staged a field experiment in Uganda discovering that usage of mosquito nets varies based on the gender of the recipient in the family (2009).

To give fair credit, my experiments are adaptations of Iversen's and Hoffmann's protocol. The adaptation from Hoffmann's experiment tests the hypothesis of the existence of bargaining in economic decision making (related to a product for the baby's welfare) between teenage mothers and their mothers while Iversen's trust game tests for Pareto efficiency. With my participants, the trust game is repeated, and the bargaining game played only once. Though the family plays each of these three games, they are informed that the payoffs will be realized for just one of them, randomly chosen after the survey is complete. Participants were paid in vouchers for a neighborhood convenience store

or grocery.⁵

3.3.1 The Trust Game

Let me first describe the trust game, and the implications of the potential outcomes. The participants are introduced to a “magic” hat. Anything that is put into the hat doubles in value.⁶ (The doubling was illustrated with candy, which works well to pique interest and gain goodwill.) The participants then are given five coupons of fifty cents (R\$2.50 in total, approx US\$1.75) in play money representing the vouchers.⁷ The teenager is the designated owner of the hat. (The order of who is the owner is randomized, but for example’s sake let’s make it the teenager. Note that while they play the first time they know that they will be playing a second time with the other person as the owner. However all actions are all kept secret; even payouts at the end are given privately in envelopes.) Completing step-by-step comprehension questions, mother and daughter are informed that everyone, including the enumerators, will have an opportunity to place all, some, or none of the coupons in the hat. The enumerators’ values will be randomly selected also between 0 and R\$2.50. Their contribution introduces some noise so that teenager will not be able to calculate the contribution of her mother should this be the activity chosen for payout.⁸ The placement of

⁵Using actual money was originally proposed but the leaders in the Pastoral were concerned that this could be used for drugs. The enumerators were also concerned for safety. Vouchers for a local store was the optimal solution pleasing the enumerators and the leaders, and still allowing for the participants to have a wide span of choices regarding what they purchased.

⁶In a pilot study the contents were multiplied by 1.5 instead of doubling. This math was too difficult for the participants to grasp - they could not calculate the reward of how much came out of the hat - so this variation was abandoned.

⁷The number of representative bills was made odd to ensure a social norm like a 50-50 split was not feasible, giving us more insight into personal preferences.

⁸If a participant thinks that both enumerators placing zero is of high probability, then that may bias her contribution upward if she is concerned about a reprimand from the owner of the

contributions is done secretly, in envelopes, so no one will perceive the value of the contribution or lack thereof. The participants are reminded that anything they do not place in hat is theirs to keep but does not double, and all that goes into the hat doubles and goes to the teenage mother. The enumerators record the contributions, and the game is repeated (all contributions from the first game remain unknown), this time with the grandmother designated owner of the hat.

We can check that the participants understood the game by confirming self-interested behavior: when the participants are owners of the hat, they should place the entire R\$2.50 in the hat.⁹ Once it is confirmed that both participants understand, we can test for Pareto efficiency. When this game is played among strangers, the owner of the hat redistributes the income after all contributions have been made and doubled. Since the participants are not strangers—in fact they are members of the same household with plenty of interaction for redistribution—so I do not include this step in the game. Furthermore, any responses to questions regarding redistribution are not necessarily truthful. A mother may pretend to give a portion back to her daughter but after the enumerators leave, snatch it back. Leaving this step implicit does not affect the implications in our game, though, which is to determine if the family is behaving in a Pareto optimal manner: do both participants place the entire R\$2.50 in the hat when they do not own it? As discussed in the previous section, unitary and cooperative bargaining models predict Pareto optimality, while non-cooperative

hat. However I doubt this is the case. A fair number had enough trouble with addition and multiplying by two. Initially in the pilot study the contents of the hat increased by 1.5, but this math was beyond complicated for the participants. I confidently assert that no one was calculating the 1 in 25 probability about that both enumerators would draw a zero. The emphasis was on the enumerators contributing something between 0 and 2.5, just as the participants were, not that this something might be zero.

⁹This could be rational if the owner of the hat knew that the other would appropriate all gains after the game was over. Then out of maliciousness, not irrationality, might money be withheld from the hat. Unlikely this is the case here, since I found no significant difference in preferences for living with the other between rational players and “irrational” players.

bargaining does not.

In the unitary case, as long as the daughter's consumption is a normal good, the daughter will help her mother maximize income and contribute all to the hat. The mother will do the same, too. For collective models, theory indicates that once the amount spent on the public good is decided upon, the rest of the income is divided according to a sharing rule (Browning et al, 1994). The sharing rule allows each member to maximize her own utility subject to the individual budget constraint to determine individual consumption. For the purposes of this trust game, if the sharing rule is unrelated to the final distribution of income, the result is Pareto Optimal as income maximization is always preferred for both players. Yet if the sharing rule is determined by ex-post income distribution there is a possibility that the result is not Pareto Optimal. If, say, the sharing rule is based entirely on the fraction of income after the game is played, then if person one contributes all to person two, person one is left with no bargaining power at all. If person two does not sufficiently care about person one, person one may prefer to keep the money for herself. Even though this model is technically collective, the non-Pareto optimal outcome and the perceived unfairness of this sharing rule allow us to consider it to be an uncooperative model. Certainly the spirit of cooperation does not hold.

Though we are interested in family structure, this game also reveals individual preferences. Were an individual purely interested in monetary gain, the decision of how much to place in the hat would be straightforward: one only places if she expects to get more back than she puts in. With this logic, we expect an all-or-nothing approach with contributions dichotomized between 2.50 or 0. There are, in fact, many intermediate values chosen, implying non-cooperative

families require a more complex model, likely involving altruism. I present a discussion of such a model in the appendix, though it is not necessary for the basic concept that without income maximization, efficiency eludes the family.

3.3.2 The Bargaining Game

The other experiment tests additional aspects of household structure with an application of the Becker–deGroot–Marschak mechanism (Becker et al. 1964, Friedman and Sunder 1994). I measure individual and shared willingness-to-pay for a cloth counting book, with the contrast between the individual and joint valuations revealing bargaining power. If both have established individual valuations, we would expect the joint valuation to be the result of bargaining. With a teen's valuation x , a grandmother's valuation y , and a joint valuation y , we would conclude that the grandmother has more power in this relationship as the bargained valuation was equal to her individual valuation. Furthermore, I take the willingnesses-to-pay as a proxy for the value placed on child education.

The participants are informed that if this is to be the experiment for which the pay-out takes place, the grandmother receives R\$3 in vouchers and the baby book shopping is done with the R\$9 the teenager will receive. (Again, this is only one treatment. In another treatment the roles are reversed.) The participants are introduced to the counting book, a product I developed especially for this experiment. Not only are children's books a small market for middle class Brazilians, they are much too expensive for the impoverished. These products (few and far between) cost at least R\$20, more than the minimum wage for day laborers. Only 10.6% of families in the study had baby books. The counting



Figure 3.1: The Counting Book

book I designed was created in sort of a cottage industry, silk screened and sewn locally with potential to be much more affordable. Being made of strong cloth also makes it much more durable for babies than cardboard books on the market. The book can be washed, an advantage for those with messy children (and who doesn't have messy children!). Finally, it is of developmental value since it can be used to teach counting as well as to familiarize children with books. The delight of the leaders of the Pastoral indicates the book's novelty and they all appreciated its educational value (see photos).

The teenager can purchase the book in the following manner: She does not know the price of the book at the imaginary store, but she can send a fictitious messenger with the money to purchase the book. She tells the messenger up

to what price he should pay for the product.¹⁰ Anything higher than this value he should not buy it and she keeps the entire R\$9, but at a price equal to or lower than the amount indicated he buys the book for her and brings back the change. The price of the book will be drawn randomly, a whole number on $[0, R\$9]$.¹¹ However, this messenger forgets the amount the teenage mother told him and so he asks the grandmother for this same information: up to what amount should he pay for the book? Once more he forgets and asks both of them together for an amount. Finally he “arrives” at the store, and with all these amounts floating in his head, he randomly (again through a drawing) remembers one of them to compare to the store price and purchases accordingly. All change returns to the teenage mother. After hearing this story of how the game is played and answering the practice questions, the participants report their individual valuations at the same time, and following this report a joint valuation. The enumerators leave the room to allow for unobserved discussion of the joint valuation.

To analyze bargaining power, I assume that the joint valuation is the bargained result, and the two individual valuations are what each would choose were she able to make the purchase entirely on her own. This is not an exact

¹⁰I initially considered making the messenger a “she” but there was too much pronoun confusion in the instructions for this to be practical without awkward name repetition. Anyway, there does not seem to be a distrust in men to do daily tasks, and furthermore, the participants all understood he was fictitious; the fact that the enumerators were women should ameliorate concerns about the messenger’s gender.

¹¹We can see that the valuation she selects reveals her willingness to pay, approximating her utility of the good in dollars. Suppose $U(x) = v^*$. If she chooses \hat{v} lower than v^* , then for any price v on (\hat{v}, v^*) she does not purchase the good. Instead she receives income y which is less than $U(x) + y - \hat{v}$; she should choose a higher v . If she instead chooses a \bar{v} greater than v^* , then for v on (v^*, \bar{v}) she purchases the good, but her utility $U(x) + y - \bar{v}$ is less than income y . Her only choice for v that ensures that in every scenario she receives a utility of y is to choose $v^* = U(x)$. In summary, this mechanism is truth-revealing, for the participant has no incentive to name a higher price and risk paying more than she would like for the good. Nor would the participant choose a price lower than her true willingness to pay since between these two prices she finds the value of the good higher than its price and would actually prefer to own the good.

measure of utility, since the decision may be made considering how the money left over will be divided. A family with a sharing rule in favor of the grandmother will have the teenager inflating her valuation of the baby book as each dollar left over will not give her very much utility; she will find it preferable to spend on the baby book rather than receive a small fraction of the cash. When she makes the choice using her own money, she is deciding how to divide it between private goods and the baby book. When she makes the choice using her mother's money, she has a smaller fraction of the change going toward her private expenditures, whereas when she owns the endowment, she receives a larger share. She will spend more on the book when the endowment is her mother's, until the benefit of the marginal dollar spent on the book equals the sharing rule. In the cooperative bargaining case, this implies that since each individual valuation is inflated, the joint valuation (accurately bargained to balance preferences, not valuations) has the potential to be below both individual valuations, but never greater. In the non-cooperative case, the inefficiencies remain in the joint decision, and a bargained decision falls between individual valuations; all else equal it would be larger than the cooperative case. (See the technical appendix for a mathematical discussion.)

We identify a family as unitary if all valuations are the same; we can imagine this family fits the unitary model in the consensus sort of way. We could also confirm the unitary model if the individual valuations were not the same, but one joint valuation equal to the higher of the two. (We may also suspect a dictator if the valuation is equal to the lower of the two, but this is less conclusive since this could also occur in cooperative bargaining). Furthermore, if the "dictator" is owner of the R\$9 endowment, we could decisively conclude that she

has a dictatorial say over her daughter's financial decisions.¹²

In addition to varying the owner of the endowment, I also allow for a few cases where the joint valuation is reported first to determine if time is a factor in valuation. If it is, then we have to take this into account when analyzing the bargaining story. Unfortunately I have few observations where the joint valuation is given before the individual valuations due to unforeseen hindrances¹³ and slow Brazilian maneuvering through the multiple leadership layers of a very decentralized Pastoral da Criança. I decided to sacrifice the numbers of this variation to emphasize the other source of variation, more in line with the bargaining literature. I emphasize the variation in endowments because this is the variation needed to identify bargaining at the population level. If average valuations change when endowments change, there is evidence of bargaining at the population level. This strategy parallels standard empirical methodology which tests the collective model by measuring changes in consumption patterns caused by varying exogenous income. Additional income to an individual member may alter the bargaining power in the family, which will change consumption if preferences between bargainers are different. If no evidence of changes in consumption is found, a unitary model would be more likely. In our experiment I shall test if the average joint valuation is different in the different treatments; in a population that functions primarily under the unitary model there should be no change in valuation based on the endowment.

If a bargaining family, cooperative or non-cooperative, has minimal utility

¹²We could imagine that a dictator who was altruistic changing her valuation to a higher one after coming into discussion with the other person. Initially she only looks at her benefit from the book, but then the other indicates how much she enjoys it as well and this changes the dictator's utility function. However, since there is still a discussion where the dictator listens to an expression of happiness by the other person, for our practical purposes, it is a bargained outcome.

¹³the worst rains in 30 years, my fragile stomach, and a bus strike

from public goods and an extreme all-or-nothing sharing rule depending on endowment ownership, we shall have interesting findings. For example, if the grandmother expects her daughter to spend all income on private goods, when the teenager has the endowment, the grandmother will choose the maximum value, R\$9, for the baby book valuation. The grandmother will have no benefit otherwise, since all the teenage's expenditures would be private. Likewise if the teenager expected no benefit from her mother's expenditures, she, too, would choose the highest valuation for the counting book when her mother had the endowment. In the trust game, no money would be contributed to the hat in this type of family since the great majority of the winnings will be spent on private expenditures. Here the non-altruistic individual will do better keeping the money for herself than allowing the other to purchase privately.

Looking at population averages, combining the results of both games we can see what the models would predict for a representative family. In the bargaining game, let $v_m N$ represent the average valuation, where m is the owner of the endowment (g for grandmother and t for teenager) and N is the source of the valuation (G for grandmother, T for teenager, and J for joint). The chart below that indicates what results each model predicts for the population in each of the two games.¹⁴

¹⁴The dictator case is limited to a smaller subset of individuals who do not own the endowment. Having the power while owning the endowment might be a case of cooperative bargaining rather than dictatorship.

Population Model	Trust Game	Bargaining Game
Unitary Consensus	Both contribute 2.50	all valuations equal
Unitary Dictator	Both contribute 2.50	$v_{tJ} = v_{tG}$ or $v_{gJ} = v_{gT}$
Cooperative	Both contribute 2.50	$v_{gJ} \neq v_{tJ}, v_{gT} \neq v_{tT},$
Bargaining		$v_{gG} \neq v_{tG}$
Non-Coop. Barg.	Contributions	$v_{gJ} \neq v_{tJ}, v_{gT} \neq v_{tT},$
w/public good	are $\ni (0, 2.50)$	$v_{gG} \neq v_{tG}$
Bargaining	Both contribute 0	$v_{gT} = R\$9$
w/no public good		and $v_{tG} = R\$9$
and extreme sharing		
rule		

Our final point of analysis is a test if either teenagers or grandmothers as a population seem to be valuing the baby product more than the other as well as addressing the question are families, as represented by the joint valuation, willing to pay more when the teenage mother receives the transfer as opposed to when the grandmother does? Though not an exact measure of utility, it suggests how money is spent in these families. If one group is willing to spend more than another, there could be policy implications for targeted transfer programs such as Bolsa Familia. A regression of the valuations on the sources of variation as well as the individual and family characteristics helps to determine the answer to this question. (See the technical appendix for further detail.)

The treatments are randomized in the following way. There are 2 experiments, the trust game with two treatments (A and B) alternating who was the owner of the hat first and the bargaining game with four (C D E F), varying both

endowment ownership and the order of joint and individual valuations. Survey packets alternated AC AD BC BD AE AF BE BF (with a time period when only the first four were used since I thought we did not have enough time to gather more observations with the variation in joint valuation coming first – random as well, based on the rain). The enumerators were not informed of this methodology and took the next packet to the next household.

3.4 The Population

The port city of Salvador is presently the third largest city in Brazil, though it was the country's first capital. It's historical roots of slavery to support sugar production make it the center of Afro-Brazilian culture, but also leaves it with the highest unemployment rate of the larger cities (IBGE, 2009). Salvador is notorious among the Brazilians for a leisurely work pace; a journalist who had spent some time in Africa told me that even Ghanians complained about the lateness of the Brazilians in international meetings. On the other hand, the Soteropolitanos are also known for being the happiest of Brazilians and for hosting the largest street carnival in the world.

The participants in the study were recruited from the community organization Pastoral da Criança. This decentralized organization targets poor families with children six years or younger to improve their health and nutrition; pregnant women are also served. Every month the local volunteer leaders visit the families to provide guidance and support. Also occurring monthly is a community weighing, usually at the neighborhood church. The local leaders come together and weigh the children, play games, and hand out snacks. Underweight

children are targeted with special attention for the coming months. Established in 1983, this organization is highly respected in Brazil, and has expanded internationally to twenty other countries including a few in Africa and Asia. It is sponsored by UNICEF and has been nominated for a Nobel Peace Prize.

The Pastoral in Salvador is organized into three regions. The first region runs along the Atlantic coast, where the prime real estate is located. The second region runs along the bay, and the third covers the center of the city and a bit of the periphery. We worked in the second and third regions, those with a higher concentration of poorer communities and therefore, I suspected, a higher concentration of teenage mothers. Since the focus of the organization is on children and pregnant women, the Pastoral collects data mainly on the children. Therefore only the leader who worked with the mother herself knew the age of the mother. While we did not take data on those who were not in our profile, my enumerators estimate that more than seventy-five percent of teenage mothers fit into our profile. With the help of the 46 parochial coordinators and a plethora of community coordinators (also volunteers) we were able to consult with most local leaders. Around 100 of these presently worked with a teenage mother who lived with her mother, grandmother (5), or mother-in-law (17), and had been participating in the organization in the year 2008. This time lag was to prevent selection bias, in case anyone would join the organization just to participate for remuneration. In a close to complete census, we surveyed all mothers who were 19 or younger at the time of the interview and lived with their mothers.

In most cases, the leader introduced us to the teenager and the enumerators scheduled a time to return when both she and her mother would be present. The leader would accompany the enumerators to the house and stay only if

the neighborhood was dangerous enough to warrant; whenever possible we asked the leader to leave so the participant would not be influenced by her presence. In return for her assistance, the leader received the remaining supermarket vouchers that the family did not win, though most leaders seemed as though they would have helped without this benefit: they liked the topic of study and were glad to give their mothers a chance to win some money for participation.

We were unable to interview 18 families. Four suspicious grandmothers did not wish to let their daughters participate. One could not take time off from work to participate. Three moved and these we did not attempt to track down due to the safety of entering unknown neighborhoods without introduction. Two were our fault - we double booked and the families did not want to reschedule. Four belonging to one leader could not be interviewed because we lost contact with the leader - her father was in the hospital for months and then she traveled once he died. The final four were in a districts where the leaders did not venture themselves. Our census may also be incomplete from a leader's oversight. Occasionally a leader from 2008 would have left and been replaced with another. We did our best to track down everyone, even from the several communities that closed in 2008. However, these closings were due to lack of volunteers anyway, so it is not likely that there were many mothers registered in the first place. Without the data the ages of the mothers of all the children served by the Pastoral, it is impossible to know the percentage of children that are born to teen mothers, but from our census and some back of the envelope calculations, it seems that the teen mothers in the *Pastoral* responsible for around 15% of children whereas the national average is 20%. I suspect this discrepancy comes from the limited coverage of the *Pastoral*, which serves just below 10% of

poor children in Salvador.

3.5 Results

Comparing some statistics from the survey to indicators used by the Pastoral suggests that this population is more at risk than the average child served. Within the 2nd and 3rd regions of Salvador 5% of children had diarrhea in the last month, as reported by their mothers. In this population of only teen mothers, we find 35.5%.¹⁵ ¹⁶ The World Health organization recommends that babies not be weaned until two years and breast fed exclusively for six months. Of the 114 children under two years of age, only 67.5% are still breastfed. Of the 47 infants in my sample six months or younger, 31.9% are exclusively breastfed and of the 41 infants four months or younger, 34.1% are exclusively breastfed.¹⁷ Finally, within the Pastoral 87.15% of children have complete vaccinations for their age while I find that 71% of children of teenagers have not completed the vaccinations within 2 months of the schedule¹⁸, however, within 1 year and two months of the schedule, 85% of children of teenagers do complete the regimen. Unfortunately we cannot compare this to the Pastoral, since this statistic is not offered, but the World Health Organization reports that in 2008 vaccine coverage in the entire country was 96%.

¹⁵The age of the baby is positively correlated with diarrhea reporting (.24 at 99%), implying that these numbers are probably not skewed by new mothers incorrectly identifying infant feces as diarrhea.

¹⁶All statistics in this paragraph calculated from my data are significantly different from the comparison reference with 99% confidence.

¹⁷In the Pastoral 62.2% (region 2) and 53.4% (region 3) of six-month-olds are exclusively breast fed and 59.3% (region 2) and 87.5% (region 3) of four-month-olds are exclusively breast fed.

¹⁸Many children over four did not have vaccines for tetravirus and rotavirus, so I did not include these this in the calculation of the statistic, though they are in the official time line.

Comparisons to national level statistics also indicate that this is a vulnerable population. Descriptive statistics of the participants are presented in Table 3.1. Of these families 61% are below Brazil's poverty line of R\$140 per capita income per month (US\$70)¹⁹, as confirmed by a majority of families receiving Bolsa Familia, Brazil's welfare program. It is interesting to note, however, that we have some outliers of wealthier families; one grandfather even worked for an oil company and refused to tell us his income. Also note that these teen mothers on average are having children at a younger age than their mothers, reflecting the demographic trend discussed earlier.

The matriarchal domination is highlighted in these families as well. The 2000 census reports that 25.9 percent of households in the urban northeast are headed by females, while in this population 72 percent of the households are, even though in some of these families the grandmother is married²⁰ (IBGE, 2002). Table 3.2 also shows that while men are not absent from the household, monogamy is not the norm. Thus men may be less active in the baby's life, indicating that the analysis of the power dynamic of the longer lasting relationship between grandmother and teen is most appropriate.

In order to establish the necessity of an experimental approach, let us also look at the variables that would be used under a traditional econometric approach. Recall that this methodology requires demand curves for private goods (or public ones) to be analyzed when exogenous income shocks occur. Usually items like women's clothing and men's clothing can be analyzed when looking

¹⁹I adjusted the wages up R\$50 of ten formal sector salaried workers interviewed before February 1st, 2009 to correspond to the minimum wage change on that date.

²⁰This figure is two and a half percentage points higher (though not significantly different) when the question who has the most authority in the household is asked. However, the "family head" question is more formal and likely to reflect an official stance to outsiders, whereas household authority may have to do more with internal politics.

Table 3.1: Descriptive Statistics.

N=152	R\$1 ~ US\$0.55	Minimum	Mean	Maximum	Salvador's Average
Age of teenage mother		14.04	17.73 (1.48)	19.99	
Age of teenage mother when 1st child was born		13.08	16.39 (1.54)	19.95	
Age of grandmother		32.16	44.92 (7.21)	72.49	
Age of teen's eldest child		0.019	1.35 (1.26)	6.46	
Sex of teen's eldest child			41% female		
Age of grandmother when 1st child was born +		11	19.00 (3.89)	31	
Household size		3	6.38 (2.19)	12	3.47*
Percentage of families that own their own home			76.32%		79.16%*
Percentage of families with debt? +			77.48%		54.15%***
Value of annual income	R\$310		R\$10,059 (6,879)	R\$36,984	R\$23,568*
Value of annual consumption	R\$2,901		R\$10,447 (5,164)	R\$36,498	
Per capita annual consumption	R\$322		R\$1,807 (1,048)	R\$7299	
Durables	R\$0		R\$1,127 (1181)	R\$7911	
% of families with at least 1 baby book ++			10.60%		
Percentage of the families who don't receive Bolsa Familia, Brazil's conditional cash transfer program for education & health			40.13%		86.06%**
Of families who receive Bolsa Familia, how much they receive	R\$20		R\$96.51 (39.17)	R\$185	
Religious distribution of the teen mothers			43% Catholic 14% evangelical 42% no religion		(no age/sex distinction) 61% Catholic* 13% evangelical 18% no religion
Religious distribution of the grandmothers			62% Catholic 23% evangelical 14% no religion		
Race distribution of the teens			20% black 49% brown 38% pardo 3% white 1% yellow		(no age/sex distinction) 20% black* 55% brown/pardo 23% white 0% yellow 1% indig.
Race distribution of the grandmothers			30% black 38% brown 25% pardo 4% white 3% yellow		

Notes: Standard errors are in parentheses
Durables include TV, radio, large kitchen appliances, cell phones, car, etc.
+ n=151
++ Only six families have more than one baby book
*Brazilian Comparative Statistics from IBGE
**Brazilian Comparative Statistics from IPEA
***Brazilian Comparative Statistics from ETENE

Table 3.2: Distribution of Husbands in the Household. This chart emphasizes the lack of male consistency in these households. Over 40% of households have no conjugal figure for either teenager or grandmother. The staying power of men is low: a mere 18% of grandmothers are still married to the teen's father. Only 4% of families exhibit monogamy in that both the teen's father and the baby's father are a part of the household, although conditional on not being married, 39% of teenagers continue to date the baby's father.

n=152	Teen married to baby's father	Teen married to someone else	Teen unmarried	
Grandmother married to Teen's father	4%	1%	14%	18%
Grandmother married to someone else	9%	0%	15%	24%
Grandmother not married	14%	3%	41%	58%
	26%	3%	70%	100%

Table 3.3: Private Goods. The goods listed here are those that have the potential to be assignable. Yet the high level of sharing of some of these products and the low level of expenditures on those which are not shared suggest the questionability of their assignability for this population.

n= 152	Percentage of individuals who purchased the good		at least 1 person indicated consumption was shared
	Grandmother	Teen	
Potentially Private goods			
Clothes	40%	54%	56%
Jewelry	23%	33%	68%
Make-up	7%	20%	52%
Leisure (Parties, Shows, Sports)	7%	13%	-
Beauty Salon	11%	9%	-

husband and wife. However, since this population is composed of two women, clothing may not be an appropriate category. Even consumption goods like feminine products cannot be used as private goods since many of the grandmothers are still menstruating; there are cases where mother and daughter both have babes in arms. I included potentially private goods in the survey, asking each individually how much they spent on these in the last three months. I also asked if they were truly private, or if they were shared.²¹

From Table 3.3, the high level of sharing does not make these satisfactory private goods, and the two categories that remain, leisure and salon, have few people spending. This again emphasizes the poverty of the population; without much disposable income, private goods become a luxury, infrequently purchased. When all of these categories are considered simultaneously, only 62 teenagers and 47 grandmothers in 81 families have private good expenditure. That means there is no observation of private expenditure for 47% of the population. The correlation of the variables 'amount of private good expenditure per family' and 'per capita yearly consumption' is significantly positive (.3267, pvalue=.0000) as is the correlation with value of family's assets (.2759,

²¹If one person said they were shared, even if the other did not, I counted them as shared.

pvalue=.0006).²² These correlations suggest that were we to analyze demand for private goods, there would be a systematic lack of information about the behavior of the poorest families. Individually we do find grandmothers' income correlated with individual private expenditures (.3217, pvalue=.0017) but teenagers' private expenditures is not significantly correlated with their income nor with the grandmother's income. Average individual expenditure conditional on having spent is R\$72 for both grandmothers and teenagers, though teens have a higher standard error (124 vs. 82).

Even if satisfactory sources of private goods were identified, while there are sources of unearned income, as shown in Table 3.4, all of these may have selection bias, making standard analysis invalid. Bolsa Familia requires families to apply, and since it has been around for six years, with much publicity, people now come to expect such subsidies. Personality factors may affect teenagers' reception of money from the infants' fathers; more forceful teens may extract higher payments.

It is clear that standard techniques will be impossible to use with this population. Therefore, the games become the primary economic methodology of addressing the question of intra-household bargaining. Yet due their limited scope I included survey questions to inquire about decision making in the family to amplify the picture of household dynamics. In separate rooms both mother and grandmother responded individually to inquiries about who performed certain tasks as well as who masterminded them. They could respond with up to two people who made the decision, listed in order of primary and secondary importance. Table 3.5 has the results.

²²Caveat: the correlation with income is barely positive, and not significant (.0751, pvalue=.3595)

Table 3.4: Sources of Unearned Income. Categories are not mutually exclusive. While most grandmothers receive unearned income in the form of Bolsa Familia, Brazil's conditional cash transfer program, and a large proportion of teenagers receive money from the baby's father, this unearned income is not exogenous. Bolsa Familia has selection effects and has been available for many years. The teen's personality may also play a great role in her relationship with the baby's father. In only 17% of families both teenager and grandmother have no source of unearned income whatsoever.

	Teen Mother	Grandmother
n	152	152
Bolsa Familia	3%	57%
Pension (including child support for teen)	1%	5%
Money from Baby's Father	44%	-
Other	11%	22%
No unearned income	51%	30%

It is interesting to note that, with the exception of a few categories, there is far more disagreement than concordance. In some cases, that disagreement is both participants claiming responsibility for the act (see column % of families where both teenager and grandmother were reported as important by both and had disagreed on who was of principal importance). Only in one decision making category was there a relatively large agreement that another besides the teen mother and grandmother was participating: paying for the teenagers' clothes. Here the teen's husband or boyfriend was referenced. Also interesting of note are the categories of low disagreement: who physically takes the baby to the health clinic and decisions regarding the grandmother. This suggests that the grandmother has a fair bit of autonomy and that there are some areas of her life where bargaining is not taking place, at least not with her daughter. The fourth and fifth column illustrate the low degree of potentially cooperative thinking. This column represents the families where both mother and daughter reported that they both are responsible for the task. The lack of families with both members agreeing that they are both responsible suggests a separate spheres men-

Table 3.5: Concordance About Who Makes the Decision. Teenagers and grandmothers responded to these questions in separate rooms and had the option of listing up to two individuals who were responsible for the different duties. If agreement on teen is significantly different (at 95% or higher) than agreement on grandmother, then the larger of the two is in bold. Column “Disagreement” notes the high degree of discord in many topics. Yet column six shows that though there was discord, in a few instances both grandmother and teenager were listed by both as participants in the activity; numbers are bold in this column if differing significantly from zero. For example, though 43% of families disagree about who decides if the baby needs clothes and who buys the clothes for the baby, the families are more united about deciding if the baby needs clothes since in 3% of families both grandma and teen listed both as important, while none did for the question about who buys the clothes. Likewise column seven shows that though concordance in column one or two may be high, both teenager and grandmother are recognized as playing an important role. Values statistically different from zero are in bold. The high 74% of agreement on teenagers being primarily responsible for taking the baby to the health clinic is qualified that in 8% of families the grandmother has been recognized as playing a role, too.

Who Is Principally Responsible?					% of families in which both teen & gmma were reported as important by both but had disagreed on principal importance	% of families in which both teen & gmma were reported as important by both & had agreed on principle importance
Decision	Agreement Teen	Agreement Grandma	Agreement Another	Disagreement		
Takes the baby to daycare*	38%	13%	6%	44%	25%	75%
Decides if the baby needs to go to daycare*	44%	13%	0%	44%	0%	31%
Takes the baby to the health clinic	74%	14%	0%	13%	3%	8%
Decides if the baby needs to go to the health clinic	22%	30%	1%	46%	1%	3%
Goes to the store to buy clothes & products for the baby	39%	14%	5%	43%	0%	1%
Decides that the baby needs clothes	32%	22%	2%	43%	3%	3%
Decides that the grandmother needs clothes & products	2%	75%	0%	23%	0%	0%
Pays for the grandmother's clothes & products	0%	72%	7%	22%	0%	0%
Decides the teen mother needs clothes & products	52%	9%	1%	38%	5%	6%
Pays for the teen mother's clothes & products	9%	32%	21%	39%	7%	0%
Decides if the adolescent can go out without the baby	5%	61%	0%	34%	0%	0%
Decides if the grandmother can go out without the baby	0%	95%	0%	5%	0%	0%

* N = 15 since not all families have day care

Table 3.6: Opinions of Self and Other. These questions about opinion of self and other were asked in separate rooms. For the first two questions, 5 is “very satisfied” and 1 “not stratified at all.” Both teenagers and grandmothers think more highly of grandmothers’ parenting skills than the parenting skills of teens, though teenagers think a little higher of their own skills than the grandmother thinks of them. The last chart again has 5 as “yes, strongly agree” and 1 “no, not at all.” With many answers of 5, these families are quite close knit.

Evaluation of teen's child care skills: how satisfied are you with the care the teen has for the baby? (n=150)						
		Teen's	Opinion			
		1	2	3	4	5
Grandma's Opinion	1	0%	1%	1%	3%	3%
	2	1%	1%	1%	3%	5%
	3	0%	1%	1%	5%	9%
	4	0%	0%	3%	2%	11%
	5	0%	1%	3%	6%	39%
		1%	3%	9%	19%	67%
Evaluation of grandma's child care skills: how satisfied are you with the care the Grandmother has for the baby? (n=150)						
		Teen's	Opinion			
		1	2	3	4	5
Grandma's Opinion	1	0%	0%	0%	1%	0%
	2	0%	0%	0%	1%	1%
	3	0%	0%	0%	0%	3%
	4	0%	1%	1%	1%	9%
	5	3%	3%	1%	4%	73%
		3%	3%	3%	6%	85%
Do they like each other: would you still like to live with the other if you were a millionaire? (n=150)						
		How	Much	Teen	Likes	Grandma
		1	2	3	4	5
How Much Grandma Likes Teen	1	4%	2%	0%	0%	9%
	2	1%	1%	1%	0%	3%
	3	0%	0%	1%	0%	3%
	4	0%	0%	0%	1%	3%
	5	7%	1%	5%	5%	54%
		11%	4%	7%	5%	73%

tality, although here there is only one sphere, the infant, with both claiming it as her own. Table 3.6 supports this, with teenagers claiming much more responsibility for baby than grandmother, even though they spend almost the same amount of time with the baby.

Table 3.6 also reveals information about attitudes toward self and the other. On average, both teenager and grandmother indicate they have a higher regard for the grandmother’s capacity in caring for the child. Yet while teens spend

slightly more time with the child than grandmothers (14.56 waking hours as opposed to the grandmother's 10.35 waking hours, statistically different at 99%), the teenagers claim many more of these hours as hours that they are principally responsible for the baby. Grandmothers claimed 5.48 hours while teenagers claimed 13.69 hours (also statistically different at 99%). If grandmothers have a comparative advantage as well as an absolute advantage in child care, the allocation of who cares for the child may be inefficient. This concern is ameliorated by the finding that in more than half the families both members would like to live together even when very rich; we do not rule out cooperation as a model.

3.5.1 Results of the Trust Game

We now turn to the experimental results. The trust game is a test of efficiency within the family. Table 3.7 checks for balance of the two randomized groups A and B for the first experiment: grandmother owner of the hat first and teenager owner of the hat first. For the most part we have very close alignment, except that treatment A has older grandmothers.²³

The test of comprehension also suggests that the second time the game is played the individual is more likely to understand. Even though the instructions were not repeated after playing the 1st round and were written clearly (available upon request), I postulate that the first time the game is played there may be some doubt as to whether the game will indeed be repeated with a new owner of the hat, or if ownership is randomized and the game only played once. Therefore the individual holds out a little bit of the contribution, just in

²³Three families are not included as there was a discrepancy about which treatment they were in.

Table 3.7: Balance in the Trust Game. This table checks for balance between the two treatments, Teenager or Grandmother owner of the hat first. Most of the table is the summary statistics, but the last four rows are outcomes. The misunderstanding teenagers and grandmothers are balanced across treatments. On average the teenagers placed a slightly higher amount (only .15 cents) in the hat when it went first to the grandmother, perhaps due to the doubt that they may be receiving the contents in the first round. Grandmothers did not seem to have had this misunderstanding.

	Treatment A Owner of the hat first Teen	Treatment B Grandmother	P value
N	71	78	
Age of teenage mother	17.74	17.74	0.668
Age of teenage mother when 1st child was born	16.19	16.57	0.136
Age of grandmother	46.32	43.59	0.022
Age of grandmother when 1st child was born	19.35	18.62	0.256
Percentage of households with unwed teens	65%	74%	0.206
Percentage of households with unwed grandmothers	52%	63%	0.189
Percentage of households with the grandmother as household head	70%	74%	0.472
Household size	6.38	6.31	0.839
Percentage of families that own their own home	75%	79%	0.485
Percentage of families with debt	79%	76%	0.675
Value of annual income	9374	9093	0.793
Value of annual consumption	10740	10099	0.453
Per capita annual consumption	1820	1800	0.906
Assets Value (TV, radio, friges, cell phones, car, etc. - not house))	1241	1040	0.303
Percentage of the families who don't receive Bolsa Familia	39%	43%	0.724
Religious distribution of the teen mothers	42% Catholic	42% Catholic	.995
	12% evangelical	15% evangelical	.638
	43% no religion	42% no religion	.747
Religious distribution of the grandmothers	63% Catholic	58% Catholic	.585
	25% evangelical	21% evangelical	.612
	11% no religion	16% no religion	.348
Race distribution of the teens	20% black	16% black	.632
	52% brown	46% brown	.471
	1% white	5% white	.211
	25% pardo	32% pardo	.371
	1% yellow	0% yellow	.296
Race distribution of the grandmothers	32% black	28% black	.581
	35% brown	41% brown	.469
	3% white	5% white	.477
	27% pardo	22% pardo	.483
	3% yellow	4% yellow	.730
% of Teens who did not understand	14.08%	14.10%	0.997
% of Grandmothers who did not understand	16.90%	14.10%	0.639
Teen's Contribution to Grandmother contingent on understanding	2.14 (.52)	2.29 (.37)	0.059
Grandmother's contribution to Teen contingent on understanding	2.22 (.41)	2.14 (.61)	0.354

case hat ownership goes to the other person. (Table 3.7 indicates this confusion may have held for teens. Their average contribution was higher when the grandmother owned the hat first, perhaps due to the doubt that they may be receiving it.) But the owner of the hat in the second round knows for sure that the contents of the hat will be her own and confidently places all into the hat; those who owned the hat and placed less than R\$2.50 in it in the second round clearly did not understand. Likewise, we also know an individual did not understand if her contribution to other in the second activity was larger than contribution to self in 1st activity. There were nineteen teenage mothers and twenty-two grandmothers whose behavior matched this criteria, and a total of thirty-nine families could not be included in the analysis of family bargaining due to at least one of the members not comprehending the activity (17 families from Treatment A and 18 families from Treatment B).²⁴ If families are already operating in a Pareto Optimal manner, the doubt about randomization would not affect their outcome at all. There were forty-four families who maximized family income. We shall consider the other forty-five families to be non-Pareto Optimal. On average, I reject Pareto Optimality as a characteristic of the population as a whole since the sum of contributions made by the teenager and grandmother are significantly less than 5 (mean 4.34, s.dev. .057, p-value .000).

²⁴One of my enumerators had been a teacher and was very good at commanding attention, yet even then, people were still not comprehending. I postulate several causes to this "just not getting it". One is that these types of games are completely foreign. Even though we explained it clearly and practiced with them, the information did not sink in and they were not able to make the small connection from the practice to actually playing. This might be due to cognitive ability, lack of familiarity with numbers and money. I tested to see if grandmothers who didn't understand were correlated with those who didn't have jobs, and if teenagers who didn't understand were correlated with those who no longer attended school, but these did not come out significant. These sorts of challenges with comprehension and money could have serious implications. Credit seems to be easy to acquire in Brazil, mostly for consumable goods. Most department stores offer their own credit cards. Most stores allow for payments to credit cards to be divided over four months. It seems as all these "benefits" creep up on the beneficiaries and they end up with more than they can handle. I checked to see if having the grandmother as household head is correlated with those who have debt. Surprisingly it came out exactly the other way: female household head is correlated with not having debt: -.189 (p-value .036).

Table 3.8: Distribution of Contributions to the Other. 55% of understanding families exhibited Pareto Optimal behavior in the trust game. The other families were also generous with few low valued contributions. No one contributed zero.

		Contributions by Grandmother					
Matches of contributions by % of families who understood	N=110	\$ 0.50	\$ 1.00	\$ 1.50	\$ 2.00	\$ 2.50	
Contribution by Teen Mother	\$ 0.50	0%	0%	0%	0%	0%	0%
	\$ 1.00	0%	1%	1%	0%	2%	4%
	\$ 1.50	0%	1%	2%	3%	4%	9%
	\$ 2.00	1%	2%	3%	3%	9%	17%
	\$ 2.50	0%	2%	5%	7%	56%	70%
		1%	5%	10%	13%	71%	100%

To better understand how non-Pareto optimal families behaved, look at Table 3.8 to see the distribution of pairs of gifts. It is interesting to note that not a single person kept all to herself; there was always a contribution. In most cases, this tended toward R\$2.50 rather than zero, consistent with our reports of families who generally seem to like each other but don't necessarily take responsibility together. This would suggest the non-cooperative games have a public good element to them, or some sort of altruism.

3.5.2 Results from the Bargaining Game

This game does not have a built-in check about whether people understood or not, though our overall impression was that this game was easier since going to a store is more intuitive. One family clearly did not understand as they reported valuations of R\$.50, but were supposed to only use whole numbers. They are excluded from the analysis. The other doubt is that some may have fixated on the possibility of winning the book for free, though we tried to emphasize that if they put down zero as their valuation, the probability of getting the book was slim. While 40 of 300 individuals selected a valuation of zero, of these, only two of these were in the group that did not understand the first game. Any error,

Table 3.9: Balance in the Bargaining Game.

	Treatment C	Treatment D	Treatment E	Treatment F	endowment variation CE vs DF	joint first variation CD vs EF
Joint Valuation done First	X		X	X		
Endowment goes to Teen Mother	X		X	X		
N	53	59	20	16		
Age of teenage mother	17.77	17.75	17.43	17.75	0.644	0.614
Age of teenage mother when 1st child was born	16.61	16.27	16.05	16.4	0.670	0.527
Age of grandmother	45.08	44.39	45.03	45.79	0.855	0.579
Age of grandmother when 1st child was born	19.35	18.71	19.5	18	0.359	0.942
Age of child	1.18	1.49	1.39	1.35	0.318	0.885
Sex of child (% female)	39%	39%	45%	41%	0.922	0.433
Percentage of households with unwed teens	42%	68%	65%	76%	0.829	0.826
Percentage of households with unwed grandmothers	52%	61%	50%	71%	0.163	0.596
Percentage of households with the grandmother as hh head	78%	75%	55%	63%	0.901	0.041
Household size	6.43	6.29	6.5	6.35	0.704	0.792
Percentage of families that own their own home	78%	81%	55%	82%	0.298	0.106
Percentage of families with debt	81%	71%	85%	76%	0.213	0.431
Value of annual income	8820	8926	10901	9771	0.481	0.271
Value of annual consumption	10544	10256	11612	9227	0.665	0.827
Per capita annual consumption	1795	1832	1977	1551	0.862	0.167
Assets Value (TV, radio, fridges, cell phones, car, etc. - not house))	1283	1149	953	820	0.796	0.131
Percentage of the families who don't receive Bolsa Familia	46%	39%	25%	47%	0.862	0.476
Religious distribution of the teen mothers (Catholic, evangelical, no religion)	46% Catholic 13% evangelical 40% no religion	37% Catholic 17% evangelical 44% no religion	30% Catholic 15% evangelical 55% no religion	59% Catholic 6% evangelical 25% no religion	.944 .968 .799	.622 .458 .904
Religious distribution of the grandmothers (Catholic, evangelical, no religion)	59% Catholic 26% evangelical 15% no religion	63% Catholic 29% evangelical 8% no religion	55% Catholic 10% evangelical 25% no religion	70% Catholic 11% evangelical 17% no religion	.296 .757 .173	.738 .028 .162
Race distribution of the teens (black, brown, white, pardo, yellow)	13% black 52% brown 6% white 27% pardo 2% yellow	24% black 49% brown 2% white 25% pardo 0% yellow	20% black 45% brown 0% white 35% pardo 0% yellow	12% black 47% brown 6% white 35% pardo 0% yellow	.229 .638 .589 .630 .338	.793 .464 .770 .421 .559
Race distribution of the grandmothers (black, brown, white, pardo, yellow)	31% black 35% brown 6% white 24% pardo 4% yellow	37% black 34% brown 5% white 20% pardo 3% yellow	15% black 50% brown 0% white 30% pardo 5% yellow	18% black 47% brown 0% white 35% pardo 0% yellow	.229 .589 .922 .780 .717	.793 .198 .144 .165 .770

then, by consistent misunderstanding is likely small.

I found no significant interaction terms between treatments, nor are the interaction terms jointly significant, so I analyze each variation separately. Pooling treatments C and D and comparing them to pooled treatments E and F allow for a test in an effect in the order of valuations. Pooling treatments C and E comparing them to treatments D and F tests if valuations change when the endowment changes. In Table 3.9 we find our sub-samples well balanced.

Table 3.10 reports the average valuations for each individual within each treatment and Table 3.11 tests for significant differences across our two variations by including interaction terms. In addition to examining the behavior of the entire sample, I examine the behavior of the Pareto efficient families and the non-Pareto efficient families who understood the trust game. Since our games are testing different facets of the same models, we may expect there to be some

Table 3.10: Valuations in Brazilian Reais. Average valuations by treatment and individual. Standard deviations in parentheses. All values are quite close. Table 3.11 tests for significant differences between the valuations.

	Treatment C	Treatment D	Treatment E	Treatment F
R\$1~US\$0.50				
Joint Valuation done First			X	X
Endowment goes to Teen Mother	X		X	
N	53	59	20	16
Teen Mother's Valuation	3.42 (.359)	3.60 (.335)	3.90 (.512)	3.06 (.680)
Grandmother's Valuation	3.13 (.329)	3.33 (.348)	3.20 (.474)	3.69 (.783)
Joint Valuation	3.41 (.376)	3.87 (.393)	4.00 (.508)	3.06 (.655)

sort of difference in the way the two groups behave. Likewise family and individual characteristics should be influencing valuations through both the sharing rule and individual utility, but I find these not to be significant and do not report them with the findings.

The top boxes of Table 3.11 do not indicate significant changes caused by switching the endowment from one person to the other, meaning these data do not reject the unitary model. Likewise in the boxes below there are no significant changes in valuations caused by eliciting the joint valuation first rather than second. We conclude that on average the short time span between writing the individual and joint valuation does not change valuations very much, if at all. What we do, see, though, is including dummy terms for behavior in the trust game does yield a significant difference in the valuations of the Pareto efficient families from the non-efficient families while the non-understanding families do not. Valuations in Pareto efficient families were, on average, R\$1.25 lower.

Table 3.11: Bargaining Results. The top chart uses as the base case the teenager's valuation when the grandmother has the endowment. In the top left regression we have the entire sample considered. The coefficient corresponding to GmmaVal tells us that on average the grandmother values the book slightly less than the teenager, all else constant. Likewise we find the JointVal(uation) also slightly lower but neither is significant. The test for bargaining is found from the coefficient TeenEnd(owment), and its interaction terms: GVTE is TeenEnd interacted with GmmaVal and JVTE is TeenEnd interacted with JointVal. None of these are statistically significant, indicating that the change in endowment affects results little, if at all. Another specification to the right includes dummy variables indicating the family's behavior in the trust game. Members of Pareto optimal families place significantly lower valuations than non-Pareto efficient families. The same results hold when examining the other permutations of the regression corresponding to the other base cases. The bottom chart pools the same data in a different way, examining if the order in which the valuations are solicited causes any change. Again, no statistically significant results are found for the entire sample, except for the same outcome with Pareto optimal families.

Varying endowment ownership						
Dependent Variable Val	Number of obs 444			Number of obs 444		
	F(5, 438) 0.370			F(7, 436) 3.41		
	Prob > F 0.871			Prob > F 0.002		
	R-squared 0.004			R-squared 0.052		
	Adj R-squared -0.007			Adj R-squared 0.037		
	Root MSE 2.623			Root MSE 2.565		
	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t
GmmaVal	-0.301	0.434	0.488	-0.301	0.425	0.478
TeenVal	0.068	0.434	0.875	0.068	0.425	0.872
TeenEnd	0.267	0.431	0.536	0.238	0.422	0.573
GVTE	-0.005	0.610	0.993	-0.005	0.596	0.993
TVTE	-0.282	0.610	0.644	-0.282	0.596	0.637
constant	3.479	0.307	0.000	4.073	0.349	0.000
PO				-1.251	0.286	0.000
notund				-0.239	0.319	0.454
Varying order of valuation						
Dependent Variable Val	Number of obs 444			Number of obs 444		
	F(5, 438) 0.320			F(7, 436) 3.420		
	Prob > F 0.899			Prob > F 0.001		
	R-squared 0.004			R-squared 0.052		
	Adj R-squared -0.008			Adj R-squared 0.037		
	Root MSE 2.623			Root MSE 2.565		
	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t
GmmaVal	-0.429	0.351	0.222	-0.429	0.343	0.212
TeenVal	-0.143	0.351	0.684	-0.143	0.343	0.677
Joint1st	-0.299	0.503	0.553	-0.385	0.495	0.436
GVJ1	0.512	0.711	0.472	0.512	0.695	0.462
TVJ1	0.282	0.711	0.692	0.282	0.695	0.685
constant	3.688	0.248	0.000	4.283	0.296	0.000
PO				-1.254	0.286	0.000
notund				-0.217	0.324	0.505

Table 3.12: Test of Treatment Effects. I divide the population into three subsets to see if bargaining behavior varies according to type of behavior in the trust game. The Pareto efficient and non-understanding families exhibited unitary behavior, but we discover that non-Pareto Efficient families exhibit some evidence of bargaining, as changing the endowment causes significantly differences for the joint valuation, the base case used. This evidence is weak, however, due to the high p value on the t and f statistics. In other permutations of the endowment variation, the grandmother's valuation is lower when compared to base case JointVal-TeenEnd (coef= -1.16 std.dev.=699 pval=0.099.) We find this same significance for the grandmother's valuation when varying the order of valuation, as well as finding that when the joint valuation is first, the valuations are lower than when the joint valuation is second.

Varying endowment ownership									
Dependent Variable Val	Pareto Efficient Families	obs	183	Non Pareto Efficient Families	obs	144	Families that didn't understand	obs	117
		F(5, 177)	0.200		F(5, 138)	1.500		F(5, 111)	1.070
		Prob > F	0.963		Prob > F	0.193		Prob > F	0.379
		R-squared	0.006		R-squared	0.052		R-squared	0.046
		squared	-0.023		squared	0.017		squared	0.003
		Root MSE	2.713		Root MSE	2.472		Root MSE	2.418
	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t
GmmaVal	0.000	0.689	1.000	-0.565	0.729	0.439	-0.474	0.785	0.547
TeenVal	-0.161	0.689	0.815	0.217	0.729	0.766	0.263	0.785	0.738
TeenEnd	0.090	0.695	0.897	1.217	0.714	0.091	-0.768	0.775	0.323
GVTE	0.367	0.982	0.709	-0.595	1.010	0.557	0.224	1.096	0.839
TVTE	0.328	0.982	0.739	-0.737	1.010	0.467	-0.663	1.096	0.546
constant	2.710	0.487	0.000	3.783	0.515	0.000	4.368	0.555	0.000
Varying order of valuation									
Dependent Variable Val	Pareto Efficient Families	obs	183	Non Pareto Efficient Families	obs	144	Families that didn't understand	obs	117
		F(5, 177)	0.360		F(5, 138)	2.260		F(5, 111)	0.130
		Prob > F	0.878		Prob > F	0.052		Prob > F	0.986
		R-squared	0.010		R-squared	0.076		R-squared	0.006
		squared	-0.018		squared	0.042		squared	-0.039
		Root MSE	2.707		Root MSE	2.441		Root MSE	2.469
	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t	Coef.	Std. Dev.	P>t
GmmaVal	0.224	0.547	0.682	-1.205	0.553	0.031	-0.500	0.713	0.484
TeenVal	-0.041	0.547	0.941	-0.205	0.553	0.711	-0.250	0.713	0.726
Joint1st	0.617	0.872	0.480	-1.880	0.903	0.039	-0.283	0.813	0.728
GVJ1	-0.224	1.233	0.856	1.761	1.276	0.170	0.367	1.149	0.750
TVJ1	0.207	1.233	0.867	0.205	1.276	0.873	0.450	1.149	0.696
constant	2.633	0.387	0.000	4.769	0.391	0.000	4.083	0.504	0.000

Exploring this finding further, I divide the population into the Pareto efficient, non-Pareto efficient, and non-understanding families. Repeating the same tests looking for evidence of bargaining and any influence caused by the order of the valuations, we find evidence of both amongst the non-Pareto efficient group; valuations are higher when the teen has the endowment, and lower when the joint valuation is done first. The non-Pareto efficient group indicates

some differences when the variation in order of valuations is considered. Presented in Table 3.12, base case JointVal-GmmaEnd reveals a suggestion of bargaining: all valuations are about one Brazilian real (50 cents) higher when the teen owns the endowment. This is particularly curious because from our theoretical discussion we expect teens to place a lower value on the item when they have the endowment, as the sharing rule is likely in their favor. Also significant in addition to those in the table are variables Joint1st and GmmaVal when comparing to base case TeenVal-Joint2nd (coefficients -1.675 and -1.000 and p-values .066 and .073 respectively). Though there are no significant differences found between the teen and joint valuations, when the joint valuation is done second, the grandmother's valuation is different. This implies some dictatorial power to the teen in this case, but when the joint valuation is done first, we cannot conclude this. We also find that the teen and joint valuations are higher when the joint valuations are done second, and lower when done first. The grandmother's valuation is relatively constant over this source of variation.

These regressions also examine the second question posed in this game: does either group, teenagers or grandmothers, "spend more" on the infant on average. We are interested to see how the population valued the counting book and if the valuations of teenagers or their mothers are higher, as an indication of who may pay more for the baby's well-being. The regressions indicate that only in non Pareto efficient families may grandmothers value the book a bit less. However, I found no family characteristics which correlate with Pareto Optimality or not. Without such information it would be very difficult to develop a policy only for non-Pareto optimal families, so I conclude there is no evidence in support of targeting transfers.

In addition to exploring statistical outcomes for the population as a whole, the data does allow us to categorize some families' individual behavior. I categorize families as consensus unitary if all the valuations (teenager's, grandmother's and joint) are the same. They are dictator families if the higher valuation is the same as the joint valuation, (though only if this person is not the owner of the endowment,) and bargaining families if their joint valuation falls within the two valuations (though even if the joint valuation falls below the two individual ones it has potential to be cooperative bargaining). There is much behavior that remains uncategorizeable, however. In many families joint valuations were above the individual valuations rather than below, suggesting that individuals together valued the good higher. Perhaps this is due to a public goods effect, where individually the value is not seen as high, but when they come together they realize this product deserves a larger investment. This conclusion does not hold for all families, though. Of the families where an individual valuation was equal to the joint, 46 families went with the higher number when deciding jointly, and 45 chose the lower number. In families with an intermediate valuation as the joint valuation, the joint valuation tended toward the lower number.

At this point we shall examine how the behavior of individual families in the trust game aligned with that in the bargaining, and if these fall into any patterns as predicted by the household models. We would expect dictator families and consensus families to have Pareto Optimal behavior, while the bargained cases may or may not. What is most surprising is that we are only able to classify just more than half of the understanding families into standard models. The others defy the predictions of the models while we are unable to draw conclusions regarding a final 39 due to their lack of understanding of the trust game.

Table 3.13: Bargaining Behavior by Behavior in the Trust Game. The outcome of the trust game finalizes the categorization of bargaining behavior. The blue are unitary, the red are cooperative bargaining, while purple may be either, according to the theoretical predictions. The green is non-cooperative bargaining. What is most striking is the number of families that don't behave according to the predictions in the models. In total of the 110 understanding families, there are 11% unitary, 11% cooperative bargainers, and another 25% that are either unitary or cooperative, 6% non-cooperative, and 47% that defy categorization into standard models and 39 families that defy categorization due to not understanding.

% of families in each category of Trust Game results according to behavior in the Book Game		The subset of "understanding" families		
		PO families	non-PO families	not und. Families
Family Types	N	61	48	39
Consensus families		8%	4%	3%
Joint <both individual valuations		10%	8%	15%
Joint=teen=lowest individual valuation		15%	4%	8%
Joint=grandma=lowest individual valuation		18%	17%	8%
Joint between individual valuations		10%	13%	26%
Joint=teen=highest individual valuation		7%, 5%	21%	15%
Joint=grandma=highest individual valuation		5%, 8%	10%	3%
Joint>both individual valuations		15%	23%	23%

3.6 Discussion

In face of a challenging endogeneity problem, the novel coupling of two economic games has given us some important insights about the relationship between teen mothers and their mothers. The population has minimal expenditure on private goods, and unearned sources of income are also shown to be endogenous. Without these key variables, standard econometric analysis is next to impossible. Fortunately experimental economic techniques allow for innovations that permit findings otherwise unattainable.

First, we have strong indication that behavior in one game is related to behavior in the other, confirming that the games test two aspects of the the same question. A family with a Pareto efficient outcome in the trust game has lower valuations in the book game. Furthermore, different patterns of valuations arise when the book game valuations are grouped by outcome of the trust game. On average, non-Pareto efficient families showed some evidence of bargaining and of valuations shifting over time. Theory would suggest harmonious and non-cooperative bargaining models for the Pareto and non-Pareto subsets of the population respectively. There is less to say about the non-understanding group since we cannot categorize them due to the lack of credible data in the trust game. Like Pareto efficient families, on average they do not exhibit variations in valuations, but they value the baby book higher than efficient families.

However, when we disaggregate the families to examine them individually, most do not align with standard models. Many families with “dictatorial” behavior in the book game do not have the Pareto optimal outcome predicted by a unitary model. A few Pareto efficient families arrive at a higher joint valuation than either of the individual valuations, a theoretic impossibility (at least in the models we explored).

These anomalies suggest that this population of teen mothers and their mothers require a different model of interaction than those typically applied in standard literature. These data offer fodder for future modeling endeavors. The statistics from the sociological questions give us a glimpse as to what elements must be present. In an average household, the teen is designated as the principal caretaker of the baby, yet the grandmother has overarching control of domestic matters. Though this scenario sounds like the rotten kid theorem, the

ability to conceal actions within domains implies that non-Pareto efficient outcomes are feasible, even within a dictatorial framework. I further hypothesize that if a teen wished to convince her mother that she was not engaging in surreptitious activity, she may over-act in accordance with her mother's wishes in the presence of her mother, as not to arouse suspicion. And perhaps her mother is doing the same. This is one explanation for why non-Pareto efficient families have higher valuations for the counting book. More theoretical work on parents and children will be helpful for providing further interpretations of these findings.

We have noted the high prevalence of teenage mothers in Brazil and the tendency for them to continue to live in their mothers' homes. These families are a vulnerable population with the children at risk for continuing in the cycle of poverty. I find no evidence that teens will spend more or less on the child's welfare than the grandmothers would, with welfare proxied as the valuation of the children's book. Thus no change in the targeting of Bolsa Familia's cash transfers is supported, a heartening result due to the problematic incentive implications of paying teen mothers. Yet most individuals agree that grandmothers are better care-givers, but that the child is principally the teen's responsibility. While this may align with the family's needs and comparative advantages, it may not be in the baby's best interests. Educational parenting interventions would be worth considering. The Pastoral already provides some, but once a month is not sufficient. Further research can be done to determine how best to address the needs of these young women, their children, and their families.

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CHAPTER 4

THE INTERACTION BETWEEN QUANTITATIVE AND QUALITATIVE RESEARCH IN DEVELOPMENT ECONOMICS: A CASE STUDY

This paper stems from some dissatisfaction I experienced during my dissertation fieldwork regarding my lack of preparation in qualitative practices, some of which would have been quite helpful even in the quantitative analysis I applied. In the first section I make a case for including more qualitative analysis within economics research and curriculum, and in the second section I draw on quantitative and qualitative analysis to develop comprehensive policy that would assist my population of interest in the field work: teen mothers who live with their mothers in Salvador, Brazil. This wider perspective allows for a broader understanding of the lives of these families as well as better-informed policy suggestions.

4.1 The Case for Integration

The social sciences have long entertained a dialogue about qualitative and quantitative research and its ability to cross disciplines. Since the beginning of the 20th century, the social science interdisciplinary movement finds roots in area studies, uniting experts in many different fields around a geographic area (Klein 1990, pg 25). Yet in spite of these common interests, a philosophical discussion of epistemology suggests a natural divide between the qualitative and quantitative approaches. With fundamental assumptions differing regarding human nature, epistemology adapts to each side of the dichotomy: in one view reality is concrete and man a responder, and in the other, reality is a created projection with man as the social constructor. A lack of precision will not be acceptable for

he who holds the first view, while he who holds the second will reject the first's conclusions: "the knowledge thus created is often no more than an expression of the manner in which the scientist as a human being has arbitrarily imposed a personal frame of reference on the world" (Morgan and Smirich 1980 pg 493). Morgan and Smirich note that this difference in epistemology does not have to imply a difference in techniques, at least not for objectivists adapting subjectivist procedures. Coding responses to open-ended questions captures this idea well. This is an easy reconciliation, but the qualitative technique is still used from within in a quantitative mindset, hardly qualifying it as qualitative.

The case for approaching a subject from both directions is strengthened when we leave dichotomous "either-or" thinking and appropriate "both-and." The differences in mindsets may be akin to the difference between the two Spanish words for "to know." *Saber* indicates a mental knowledge, while *conocer* suggests familiarity with the object. I reject the dichotomy, for one can *saber* and *conocer* at the same time; there are many scientific facts to acquire about the ocean, but splashing in it gives an entirely different sense of understanding, one which can be complementary. Bardhan and Ray (2006) better classify the distinction of these mindsets from within social science. They highlight the mindset of an economist as one who sees people as autonomous, focuses on outcomes, and delights in parsimony, while anthropologists view humans as embedded within society, explores processes, and appreciates complexity.

While these differing viewpoints may explain differences in disciplines, few claim that reality is one or the other; Bourguignon describes them as two sides of the same mountain (in Kanbur, 2001 pg 44). Within academia, concerted efforts abound to use complementary perspectives on an individual topic. Cornell

boasts over a hundred interdisciplinary centers. In Toronto, there is even an interdisciplinary center devoted to studying interdisciplinary (poverty) studies: the Q-squared project.

These movements imply that epistemological and methodological gaps are ones that can be crossed and are ones that researchers are interested in crossing. Notes from the first Q-squared conference on integrating the methods in poverty alleviation provide useful commentary. The dichotomies presented by Kanbur as those that characterize the divide between quantitative and qualitative perspectives are more varied than Bardhan and Ray's division of fundamental perspectives:

1. Type of information on population: numerical to non-numerical
2. Type of population coverage: specific to general
3. Type of population involvement: active to passive
4. Type of inference methodology: inductive to deductive
5. Type of disciplinary framework: broad social sciences to neo-classical economics

The first three emphasize which techniques are chosen, while the last two consider the underlying assumptions. In the conference, most agreed that movement and progress toward integration could be achieved on points one, two, and somewhat three. Points four and five were not seen as easy to integrate, as in Bardhan and Ray's philosophical discussion.¹ Yet though the ap-

¹These categories are not specific to poverty studies, but as the conference discussion centers around them and my topic is also in the subfield of economic development, I shall continue with examples from these disciplines.

proaches may be mutually exclusive within a specific task, the research process does not have to exclude one in favor of the other. Inductive, more anthropological methods used to formulate questions and theories, can later be tested through economic modeling and large-scale projects (Barrett in Kanbur 2001). The formulation of the numeric surveys contains qualitative aspects in creating questions and deciding which to include. Once the survey is complete, outliers can be identified and explained through qualitative means (Rao 2002).

Much research in development economics already follows this protocol, perhaps precisely because of this movement. In this past year's development economics seminars at UC Berkeley, economists have reported using a variety of qualitative methods. They have quantified typically qualitative data: Eva Vivalt (UC Berkeley PhD Candidate) coded political variables to explore the effectiveness of UN peacekeeping forces and Jonas Hjort (UC Berkeley PhD Candidate) included a values questionnaire in a survey on intra-household allocation. Owen Ozier (UC Berkeley PhD Candidate) cited anthropological evidence for exploring social risk taking in Kenya. Qualitative analysis even stood alone to support quantitative analysis: Ray Fisman discussed detailed history of the structure of Chinese firms (Columbia), and Erica Field incorporated analysis from focus groups in her analysis of health interventions (Harvard).

In spite of these tendencies, the economic development literature lacks discussion within economics about how to go about this kind of work systematically. The case has been made for it and clearly qualitative techniques are seeping into the work of top economists, but without an accompanying discussion of methodology that often accompanies the adaptation of new techniques.

As the field of economics has evolved with the adoption of new methods,

handbooks have been written to assist application. Advances in computing and statistical methods have been influential in applied economics and econometrics. Thus we consult the Stata manual and econometrics textbooks. Randomization has become a cornerstone of New Empirical Development Economics; “Using Randomization in Development Economics Research: A Toolkit” is required reading in many classes (Duflo, Glennerster, Kremer 2006). Behavioral economics has tested economic premises using the techniques of psychological experiments and network theory has provided new methods of modeling. In designing my project, I consulted *Experimental Methods: A Primer for Economists* (Friedman and Sunder 1994). The North Holland publishing company has a handbook series for economists spanning many different topics.

Yet in spite of the incorporation of qualitative techniques into development research, we do not find these handbooks for economists. The closest I came in my search for such a book was an article from 1979: “Qualitative Research Techniques in Economics” which is more a justification of open ended interviews than a didactic tool (Piore). A much shorter gem from the AER by Susan Helper provides some sound advice, albeit three pages is hardly a handbook. Building on Piore, Helper offers suggestions for doing field work with an economic mindset (but not quantitative), as opposed to an anthropological one: “Economists often go into the field with hypotheses to test. In contrast, disciplines like anthropology emphasize understanding the world as their informants do” (2000). She suggests a few ways that interviews can help first in developing hypothesis: allowing an informant to ramble, even if off topic, can be a source of alternative theories. They may say something you had not considered before. Then, once the main hypotheses are established, they can be tested through “triangulation,” collecting responses that can be cross checked

in other interviews, documents, site visits, etc. Finally, a careful write up can imply replicability and improve readers' confidence in qualitative findings. These examples show that the epistemological gap between fields need not restrict the transferability of techniques.

With such a strong case for both qualitative research and its feasibility within economics, why has its incorporation into the mainstream lagged? Julie Nelson suggests a values-based justification of quantitative analysis keep the qualitative at bay. While economists at times feel that quantitative data reflect rigor in that they are "objective" rational choice theory, the preferred analysis applied by economists, has sacrificed complexity to the ideals of parsimony, simplicity, and precision. This in itself, however, is a subjective preference for these values rather than a weighed "objective" choice. She suggests the source of this preference a historical trend that emphasizes rationality as the distinction between humans and animals. Economics has not yet embraced the physical and emotional qualities of humans that distinguish them from computers. Incorporating these into economic analysis would make the discipline more objective rather than less so. Of course these discussions involve less math, so economists may feel uncomfortable with learning new techniques and branching into new territory. While they may not "feel" as rigorous, the objective economist will recognize that this sensation is a value judgement rather than an academic analysis. (Nelson, 2009).

Fortunately some excellent economists have broken out of the mainstream framework to tackle complex issues within the qualitative realm. Within the work of household economics, for example, on the theoretical level we have Amartya Sen who, in the article "Gender and Cooperative Conflicts," engages

in an overarching philosophical qualitative discussion of intra-household bargaining (1987), while on an empirical level, Bina Agarwal's book *A Field of One's Own* grounds her conclusions in field work in Southeast Asia (1995).² Sen's work uses economic theory as a starting point and analyzes its variables and structure in light of qualitative research on women around the world. He illustrates the directions in which theory must move in order to become more encompassing of more lives. Agarwal, on the other hand, starts from experience and builds a case for land ownership as she shows how this right empowers women through complex social and economic mechanisms. Both are economic masterpieces in spite of their lack of quantitative content.

Still, instruction in economics is highly quantitative. In spite of these great works, the field is more influenced by Milton Friedman's essay on methodology. He concludes with the reflection, "the construction of hypotheses is a creative act of inspiration, intuition, invention; its essence is the vision of something new in familiar material. The process must be discussed in psychological, not logical, categories; studied in autobiographies and biographies, not treatises on scientific method; and promoted by maxim and example, not syllogism or theorem." (1966, pg 43). While I have only read this passage recently, it is a familiar sentiment echoed as words of advice by many professors to graduate students, and from graduate student to graduate student. This collective belief within the profession leaves no room for systematic qualitative work that can be the foundation of a model. Though not everyone has a "knack" for insight, surely the chasm between information and understanding can be made smaller with the appropriate organization of the information, facilitated by systematic quali-

²Of course within the realm of feminist thought it is harder to detach theory from empirics, as they are less distant cousins than within the economic mainstream. Without so many mathematical techniques separating the two, a holistic approach for arriving at and testing theories is more possible.

tative research.

Besides hypothesis building, the neglect of these skills brings consequence to other aspects of research. Without ability to undertake qualitative evaluations, economists may use perfect techniques to arrive at inaccurate results. Lacking sufficient training and preparedness, “many surveys that have been undertaken in developing countries have produced large data sets of doubtful quality and thus of uncertain usefulness” (Glewwe, 39). Economists must be able to recognize when missing data, unrealistic values, or poorly written questions are of concern.

While a grasp of these qualitative criteria of evaluation are important for an economist who works in Stata, an even more comprehensive understanding is required for those who engage in field work. Take, for example, the development of a survey, a key tool for much of economics. Paul Glewwe (Household Sample Surveys in Developing and Transition Countries UN Handbook) lays out the process of how a survey is created. From his language it is clear to see that aspects of survey design are inherently qualitative. The following quotes suggest the process of survey design includes systematic categorization using subjective criteria.

- “This process of choosing a reasonable set of objectives is more an art than a science.” (38)
- “Experience with other surveys recently completed in the same country should provide a good guide to what is feasible and what is unrealistic. . . both local experience and international experience are good guides to achieving that balance.” (40)

- “Starting the interview with simple questions on non-sensitive topics will help the interviewer put the household members at ease and develop a rapport with them.” (42)
- Enumerators’ “previous experience in collecting household survey data is indispensable. They know best what kinds of questions households can answer and what kinds they cannot answer.” (47)

The first two quotes suggest some participant observation of the survey process itself is required in order to make meaningful judgments. The latter two require skills at the inter-personal level, an ability to evaluate the relationships between the enumerators and the households, often people of other cultures. These themes certainly fall outside the cannon of economic methodology, yet underpin data gathering. Even so, it is left to the reader to determine how to achieve these skills on her own. A more pronounced acknowledgement of their role in the creation of economic knowledge could benefit the field if students learn these methods explicitly and included them in their final analyses. While economists may not be as interested in a discussion about word choice in the survey, they are much less qualified than linguists to be making these decisions, so precisely for that reason, economists should include this discussion.

Why aren’t qualitative methods incorporated in economics curriculum, if, as we have seen, they are essential for successful fieldwork? Feminists claim a masculine bias within the field: “Analytical methods associated with detachment, mathematical reasoning, formality, and abstraction have cultural associations that are positive and masculine, in contrast with methods associated with connectedness, verbal reasoning, informality, and concrete detail, which are culturally considered feminine—and inferior” (Nelson, 1996). Likewise, there has

been a noted preference for quantitative research in policy-making circles, as numbers exude scientific credibility (Kanbur in Kanbur). Another reason for this lack of instruction may be the selection bias economists have in choosing economics in a subject matter in the first place. Because qualitative research is relatively evolutionary and adaptable, explaining the processes requires narratives. Economists' comparative advantage is usually math oriented and they are less comfortable with uncertainty in methods. The laboratory write-up style is much more familiar, where all plans exist before any action is taken. The evolving project does not easily fit into this scheme.

One risk of separating the quantitative from the qualitative is that discrepancies can arise between them which economists may ignore if they are focused only on the quantitative. Vijayendra Rao's work illustrates this problem. In an article published in the AER, Francis Bloch and Vijayendra Rao incorporate ethnographic study as motivation for their model of domestic violence as a bargaining tool in eliciting transfers from a bride's family to a groom's in India (2002). They do not explain their qualitative methodology in the AER, but reference readers to another piece, which discusses it in detail (Rao 2002). Unfortunately, referees seem not to have read this second work, which holds some contradictions with the first.

In the qualitative analysis, Rao explains how a key variable had an interpretation issue:

"In studying domestic violence [in India] a question in the survey instrument asked if female respondents had ever been beaten by their husbands in the course of their marriage. Only 22 per cent of women responded positively to this question – a domestic violence rate much lower than studies in Britain and

the US had shown. In probing the issue with in-depth interviews we discovered that the women had interpreted the word 'beating' to mean extremely severe beating...Responses to a broader version of the abuse question, comparable to the questions asked in the US and UK surveys, elicited a 70 per cent positive response." (1889-1890)

Surprisingly, this measure of domestic violence with occurrence at 22 percent is precisely the outcome variable he uses in the quantitative AER paper. Bloch and Rao justify this with the following statement, seeming to contradict his previous analysis: "The question on the incidence of domestic violence, which was answered by 137 women, elicited a much more accurate response than the questions about its extent and severity" (1037). The footnote goes on to explain this choice as one due to concerns about the enumerators; there is no mention of the earlier implied embarrassment, shame, or fear as a reason for silence. "The questions on the extent and severity of violence were answered by only 70 percent of the sample. Even when the questions were answered, the responses had strong interviewer effects with some interviewers being able to elicit more complete and consistent responses than others. On the other hand, the dichotomous question on whether a woman had ever been physically assaulted by her husband was answered by all the respondents without significant interviewer effects" (1037). To further justify the use of the chosen variable they cite statistics that do not align with the story he tells in the qualitative paper: "Note that 23 percent of women said that their husbands had beaten them at some time during the marriage. This proportion is higher than the incidence in the United States, where one in six women report having been struck by their husbands during the course of a marriage, but consistent with data from other developing countries" (1039). An earlier empirical work also undermines this justification; Rao

engages in a detailed discussion about the same variable under-reporting domestic violence, cautioning the reader when interpreting statistical results (Rao 1998).

This discrepancy in variable interpretation illustrates the necessity of qualitative rigor as well as quantitative. To achieve this, economists must commit to engaging in qualitative discussion. A development of qualitative literature within the instructional cannon in the long run will ensure that others also have sufficient food for thought in executing their own projects with cultural awareness and critical standards. Since the case is so strong for qualitative work and economists recognize the importance of sound methods, quantitative or otherwise, qualitative case studies can well become protocol in and of themselves. In an era of computation where data abounds and we are inundated with statistics, qualitative expertise will help discern which we numbers can actually trust.

4.2 A Case Study

In defiance of my own economic mind-set, which leaves me doubtful of my ability create knowledge and synthesize experiences in a qualitative setting, here I incorporate my quantitative results with qualitative analysis in a discussion of teen mothers who live with their mothers. I documenting the experience of fieldwork in Salvador, Brazil, from September 2008-June 2009. The quantitative work, "Intergenerational Intra-household Allocation: Teen Mothers and Their Mothers in Salvador, Brazil" (Reynolds, 2010), describes the economic vulnerability and family structure of a sample of 152 teen mothers who live with their mothers and participate in the NGO Pastoral da Crianca. Concerned about in-

tergenerational poverty transfer to the teens' children, I attempt to understand how these families function, so that an intervention may be targeted appropriately. This paper suggests policy that may be developed. In this paper I first identify four areas of risk for the baby: material, health, developmental, and psychological. Then I summarize the family power structure, as determined in the empirical work. Finally, I qualitatively analyze social service agencies that serve teen mothers in Salvador and discuss how Bolsa Familia can incorporate aspects of them to better assist these families. Even though I did not set forth with the intention of institutional evaluation, my fieldwork experiences immersed me in the world of the social assistance agencies as through them I sought connections to teen mothers.

4.2.1 Identifying Risks

Statistics from the survey confirm the vulnerability of this population and illustrate the risk of intergenerational poverty transmission as well as health risks. The data on these households indicate that they face many more economic challenges than the average Brazilian family (See table Descriptive Statistics). The children also face health risks more than the average family served by the Pastoral da Criança. Within the 2nd and 3rd regions of Salvador 5% of children had diarrhea in the last month, as reported by their mothers. In this population of only teen mothers, we had 35.5%.^{3 4} The World Health Organization recommends that babies not be weaned until two years and breast fed exclu-

³The age of the baby is positively correlated with diarrhea reporting (.24 at 99%), implying that these numbers are probably not skewed by new mothers incorrectly identifying infant feces as diarrhea.

⁴All statistics in this paragraph calculated from my data are significantly different from the comparison reference with 99% confidence.

sively for six months. Of the 114 children under two years of age, only 67.5% are still breastfed. Of the 47 infants in my sample six months or younger, 31.9% are exclusively breastfed and of the 41 infants four months or younger, 34.1% are exclusively breastfed.⁵ Finally, within the Pastoral 87.15% of children have complete vaccinations for their age while I find that 71% of children of teenagers have not completed the vaccinations within 2 months of the schedule,⁶ however, within 1 year and two months of the schedule, 85% of children of teenagers do complete the regimen. We cannot compare this to the Pastoral, since this statistic is not offered, but the World Health Organization reports that in 2008 vaccine coverage in the entire country was 96%.

Within the literature on teen mothers, another concern for child development is the limited nurturance teens impart to their children (Oyserman, Radin, and Saltz). This, in turn, hinders the child's development. Statistically, both teens and grandmothers agree that the grandmother is a better care-giver and my own observations also align with this story. For example, I often saw them lift their children by one arm to transport them small distances, or over low barriers, like a big step or into a playpen. One young mother disturbed me greatly by bouncing her baby on her lap in the same manner one would shake a rag doll. The baby didn't seem to know what to make of it, too agitated to cry. While I assume this young woman was on drugs due to the utter jitteriness of her actions, the other teens are careless with their children due to haste and immaturity; with their limited parenting experience, teens can lack a conscientiousness of how their actions affect their children, hindering development.

⁵17 In the Pastoral 62.2% (region 2) and 53.4% (region 3) of six-month-olds are exclusively breast fed and 59.3% (region 2) and 87.5% (region 3) of four-month-olds are exclusively breast fed.

⁶Many children over four did not have vaccines for tetravirus and rotavirus indicated on the vaccination card, so I did not include these this in the calculation of the statistic, though they are in the official time line.

On a psychological level, I observed teens blaming their children. This subtle point was not included on the survey, as it was something I observed later. In the eyes of their mothers, it was the child's fault that they were crying, and that they were misbehaving, and that they had gotten hurt. Occasionally the kids would get swatted for such behavior.⁷ I asked my therapist about the implications of such treatment. In addition to aggression building - either directed inward or outward - the blaming cycle continues. The "pass the buck" mentality certainly exists in these families, but grandmothers yell at their daughters to care for their children and the daughters blame the children for getting them in trouble. While blaming and lack of nurturance are not exclusive traits of teen mothers, they are ones that can impede the development of the child and must be addressed.

The story of the family of my data entry personnel illustrates the complicated family life of a teen mother, highlighting concerns for the child: When Viviane first told Josefa she was pregnant, Josefa was upset, but soon she assimilated the news and wanted to help her daughter have a healthy baby. Jadison, is indeed a chubby little tyke - I fell in love with his smile and he fell in love with my Nalgene. Unfortunately Viviane has a nervous personality, having fallen into illnesses due to hypertension, and is now going through an adolescent crisis, as Josefa has diagnosed it. In addition to attempting to establish independence from her parents, she is also wishing she were independent of Jadison. She hits him, and Josefa becomes furious at Viviane. Due to this mistreatment, Josefa has insisted they put Jadison in daycare, even though their financial situation is tight. Josefa would like Viviane to be more conscientious. Yet the responsibility lies on Viviane to parent her child; Josefa is not yet willing to completely take

⁷Once, on a house visit, I dropped a baby and the grandmother scolded the baby for crying instead of me for dropping it!

over the mothering role, though she participates in the baby's care and scolds Viviane to do so better.

The survey has quantitatively confirmed poverty and health risks and qualitative research has identified developmental and psychological risks: a case is made that intervention targeted at these families of teen mothers is important to minimize these risks and to help these youngsters overcome these disadvantages.

4.2.2 Family Structure

Before any policy is undertaken, however, a better understanding of family interaction is required for best selecting a strategy. My analysis in the empirical paper focuses on the relationships between teen mothers and their mothers. The survey confirms that these families have matriarchal tendencies, validating the main focus of policy on teen mothers and their mothers. While men do play a role in the family, their transience suggests the most influence on children is in the maternal realm. See Table 2: Distribution of Husbands in the Household.⁸

Survey results indicate that the standard econometric technique for analyzing bargaining power in the household (constructing demand functions for private goods) is impossible since their consumption of private goods is very low. (See Table 3.3) Instead I turn to alternative methodologies of qualitative survey inquiry and economic games.

I include a section on who makes the decisions in the household. The in-

⁸The prevalence of single, female-headed households among the poor in northeastern Brazil is one of the reasons I arrived at this topic of study in the first place. My original interest in the power dynamics between husbands and wives was undermined by the lack of husbands.

spiration for these questions comes from a survey from Colombia applied to evaluate their conditional cash transfer program, *Familias en Accion*: six questions the wife in the family who made the decisions within different realms in the household, and they became the basis for questions within my own survey. I elaborated on this theme by asking not just who made the decision, but also who executed the task. For example, I inquire who takes the baby to the health care clinic, and who decides that the baby needs to go to the clinic. Teen mother and her mother answer these questions separately, and they are able to respond with up to two individuals who make the decision or do the task, in order of importance.

My impression was that these questions were not difficult to understand, as the responses were often swift and decisive: "Who decides if you need clothes or products?" "Me." "Anyone else?" "No." ⁹ (There was much more certainty about these than about the amount spent on fruits and vegetables in the past week.) The data are presented in Table 5: Concordance About Who Makes the Decision. From this we learn that in many categories, both teen and grandmother claim responsibility. The grandmother, however, clearly has control over her own realm, whereas the teen has to defer to the grandmother if she wants to go out without the baby or may rely on others to purchase her clothes. While the teen may be the one executing tasks for the baby, it is not clear who is the mastermind behind determining that these tasks need to be done. This conclusion suggests a household model where the grandmother is the overall decision maker, but in specific realms power struggles continue.

⁹Unexpectedly, the survey itself had the potential to be empowering, or at least increase awareness. Certainly it was not the case with all the families, but there were a few who commented that the relationship questions made them think. There were also several entrepreneurs who were pleased to calculate their profits; we helped them do so on the income portion of the survey. While household surveys are not intended to be an intervention, they could hold a hint of "consciousness raising" in the spirit of Paulo Freire.

To complement the sociological questions, I also include economic games addressing household behavior. In general, games can be quite convincing as monetary economic incentives provide a snapshot of economic decisions in action, even though they are a simulated reality. The challenge of game design is to simplify an economic question to its essence in a way that convinces the outsider that the participants fully understand the activity and value the payoff. My games addressed the questions of trust in the family and if there was negotiation when a decision was made, or if one person dominated the decision making process.

The two games were a trust game and a bargaining game. In the trust game the participants are introduced to a “magic” hat. Anything that is put into the hat doubles in value. The participants then are given five coupons of fifty cents (R\$2.50 in total, approx US\$1.75) in play money representing the vouchers. The teenager is the designated owner of the hat.¹⁰ Completing step-by-step comprehension questions, mother and daughter are informed that everyone, including the enumerators, will have an opportunity to place all, some, or none of the coupons in the hat. The enumerators’ values will be randomly selected also between 0 and R\$2.50. The participants are reminded that anything they do not place in hat is theirs to keep but does not double, and all that goes into the hat doubles and goes to the teenage mother. After a first round, the game is repeated (all contributions from the first game remain unknown), this time with the grandmother designated owner of the hat. It is easy to conclude that a family has more trust the larger the contributions to the other when the other is the owner of the hat.

In the bargaining game, the grandmother receives R\$3 in vouchers and the

¹⁰The order of who goes first is randomized.

baby book shopping is done with the R\$9 the teenager will receive. (Again, this is randomized; half the time the roles are reversed.) The participants are introduced to the counting book, a product I developed especially for this experiment.¹¹ The teenager can purchase the book in the following manner: She does not know the price of the book at the imaginary store, but she can send a fictitious messenger with the money to purchase the book. She tells the messenger up to what price he should pay for the product. Anything higher than this value he should not buy it and she keeps the entire R\$9, but at a price equal to or lower than the amount indicated he buys the book for her and brings back the change. The price of the book will be drawn randomly, a whole number on $[0, R\$9]$. However, this messenger forgets the amount the teenage mother told him and so he asks the grandmother for this same information: up to what amount should he pay for the book? Once more he forgets and asks both of them together for an amount. Finally he “arrives” at the store, and with all these amounts floating in his head, he randomly (again through a drawing) remembers one of them to compare to the store price and purchases accordingly. All change returns to the teenage mother. After answering the practice questions, the participants report their individual valuations at the same time, and the enumerators leave the room to allow for unobserved discussion of a joint valuation. Our interpretation of the results is as follows: the joint valuation is going to represent the bargained result. If the joint valuation is equal to one of

¹¹Not only are children’s books a small market for middle class Brazilians, they are much too expensive for the impoverished. These products (few and far between) cost at least R\$20, more than the minimum wage for day laborers. Only 10.6% of families in the study had baby books. The counting book I designed was created in sort of a cottage industry, silk screened and sewn locally with potential to be much more affordable. Being made of strong cloth also makes it much more durable for babies than cardboard books on the market, ones I initially proposed. The book can be washed, an advantage for those with messy children (and who doesn’t have messy children!). Finally, it is of developmental value since it can be used to teach counting as well as to familiarize children with books. The delight of the leaders of the Pastoral indicates the book’s novelty and they all appreciated its educational value (see photos).

the individual valuations, we expect that that person has all the power, whereas if we have an intermediate result, we have bargaining.

The enumerators practiced administering the games to their family members, to determine that an average person understood how the games worked before testing them on the population in question. From this pilot I ended up adapting the magic hat game. A calculation involving the contents of the hat being multiplied by 1.5 was too challenging for many participants. All the practice questions to determine if they understood went too slowly because of the math, the outcomes undermined by probable miscalculations. I changed the multiplication to doubling, and that went much faster. Yet even with this adaptation, about 15% of people still had trouble. The second game had a greater understanding by the participants, perhaps due to its more natural framing; magic hats are not so common in Brazil.

On the other hand, this high level of lack of miscomprehension brings up many more questions, related more to vulnerability than family structure. Clearly, there were some people who just did not get it in spite of being led through the practice procedure.¹² The quantitative evidence does not tell us why, but my observations suggest the obvious: some people have more difficulty grasping new concepts and procedures. I have encountered students like this, who cannot grasp concepts no matter how much it is explained and the mechanics of the problems walked through. It is not surprising that some Brazilians will also have similar challenges. The fact that the challenge seems so simple is a bigger puzzle. Perhaps they “just don’t get it” because they have taken drugs. A few great-grandmothers (grandmothers of the teens) were quite old and not used to doing math. Perhaps others shut off their brain right away

¹²Script available upon request.

when they discover math is required - the monetary incentive may not have been high enough to offset the effort of thinking, though we tried to keep it simple by spelling out the optimal strategies in examples. This latter hypothesis comes from my enumerators: when playing for real, participants were not self-disciplined enough to remember the ideal strategy. Whatever the reason, there are important implications. If indeed the people do not understand the game because it was out of the ordinary, how will their lives be affected by new innovations? For me, the experiment has brought up new questions of considerable importance. If people are not taking the effort to do simple calculations, how can these people understand credit cards or investment plans? They may not be able to determine if they are getting the full benefit from Bolsa Familia, which can include a base amount and a variable amount, different for children and teens; they may never realize there was a data entry error. Some people do not even know how to sign up for Bolsa Familia, as the enumerators were frequently asked in the streets if they were with the program.

The results of the trust game suggest that families are fairly cooperative. In one third of the families, both players put everything into the hat. In no family did anyone keep all the money for themselves; the contributions were closer to the maximum amount than to the minimum. In the bargaining game, while a few families were identified as bargainers, on average there was no overall tendency within the population to bargain (see Chapter 3 for statistical analysis). This suggests that whether a transfer was targeted to one member of the family or the other, the outcome would be the same. Thus, for these families where teen mothers live with their mothers, the current Bolsa Familia policy of the transfer going to the female household head rather than a minor seems adequate. With a high level of financial cooperation between mother and

daughter, and little evidence of bargaining, there is no reason to suspect that outcomes would improve based on shifting the recipient of the transfer.

But this does not imply that no policy changes are necessary. The current ones are certainly not sufficient, as many of these families receive Bolsa Familia yet are still high risk. The vaccination rates are not significantly higher for children whose families are enrolled in Bolsa Familia than for those who are. Likewise the school enrollment rates for teen mothers are not significantly higher for those in Bolsa Familia families than for those not in program families, except, ironically, for 18 and 19 year olds, who are no longer eligible for the stipend.

These last two statistics suggest that the conditionalities required by Bolsa Familia are too challenging or are unattractive for teen mothers. While we would not wish to reward teen pregnancy by giving a higher stipend to teen mothers, we can change the conditions of the program for these families in particular. The policy decision here is delicate, as the cycle of poverty must be addressed, and the children of the teens provided for. Yet there must not be so much attention and service that other teens desire to become pregnant to receive these benefits. A paper by Hotz, McElroy, and Sanders suggest that parents of teen mothers in the USA already understand this concept well: parents give less support to teen mothers who have a younger sister (2005). Of course employing this strategy-giving more to teen mothers without a younger sister-would be hard to justify at a government level, but the insight is valid. We will take incentives into consideration when analyzing the social service agencies.

4.2.3 The Social Service Agencies

From my fieldwork experiences I identify three models of social service agencies that serve teen mothers. The first is the community center, where forming a support group is a primary element. The second is home visits, where one-on-one parenting education is emphasized. The final is the conditional cash transfer model, where monetary stipends are provided in exchange for fulfilling health and educational requirements. With the exception of the organization functioning under charity model, none encountered were directed particularly toward teen mothers. Shifting curricula or conditionalities for this special group could better meet their needs, alleviating the four risks identified that children of teen mothers face: poverty, health, developmental, and psychological.

The community center Centro Julieta is part of a larger community organization, Viva Children, Youth, and Families. This project was started decades ago by a Belgian ex-nun and now incorporates many services. They have a pre-school, an after-school program (including a small computer room and sports classes), and a training program for youth to learn technical skills. (For example, the youth undertake construction projects improving community members' homes.) Finally, in the Centro Julieta young mothers bring their learn to become better parents in a community setting. Viva Children, Youth, and Families used to support a health clinic as well, but now their main medical activity is setting up field trips for dental visits for the after-schoolers.

Much funding comes from the director's financial campaigns in Belgium, and as they have received many Belgian volunteers over the years, these individuals continue giving. Local donations are procured as well, with a wealthy

ladies group sponsoring the Easter celebration.¹³ They also receive funding from the government, as the programs are of the sort that the government sub-contracts to NGOs. For example, the government program PETI (Program for the Eradication of Child Labor) ensures children at high risk of child labor have alternate activities such as the after-school program. The center receives funding according to the number of PETI children enrolled. They also received money for their job training, as vocational training for youth is another government project, *Jovem Aprendiz*. However this funding was suspended as they were not providing the “proper” safety equipment for the youth under 18.¹⁴

The Centro Julieta is unique to Salvador. Again, an innovation by Francine, this program aids a group of young mothers (not necessarily teens) of a vulnerable economic situation. As part of the organization’s larger complex, the center’s main room had a large kitchen area and a fenced off play area. Several cribs and playpens were available for napping children. Another portion of the building had a wash area next to outdoor clotheslines, and a bathroom with a tub. Most of the toys were Belgian donations, not typical of what a Brazilian family would have.

Food was served to improve the women’s and babies’ nutrition, as well to lighten participants’ food expenditures. The day started with breakfast of bread, fruit, and coffee. There was a prayer, and the rest of the morning lunch was prepared. There was always rice and beans, some vegetables, occasionally pasta and either chicken or beef cooked in a pressure cooker, often with the vegeta-

¹³A similar program has employed 15 telemarketers to make local calls and a motocyclist then travels to collect the donation. While most of the donations are very small to only be marginally profitable to the organization, they continue the endeavor.

¹⁴Francine was very upset about this, as she considered the equipment absurdly expensive, nothing that local (informal?) professionals used. Since they would not be able to purchase the equipment, the youth would not learn and would go back to wasting away their lives!

bles. A short down-time followed lunch, and then clean-up. An afternoon snack was served right before it was time to leave and sometimes the women took leftovers with them for dinner.

All of these chores in theory were shared, but usually Marta did more than everyone else. She and another had been invited that year to help out as example mothers. There were also two permanent staff members, Dona Marinalva and Ana. Marinalva was a plump, earth mother and Ana was a sweet religious figure with strong convictions but was not one to philosophize. They are simple people, Marinalva more jovial than Ana, but the latter just as content. They care deeply for these women and want them to succeed. Ana and Marinalva kept everything in order, ensuring that children were not neglected and that everyone was helping out. But some were less helpful than others.

A core group of around 10 young women (not all teens) with their babies attended daily, with a larger number coming for Wednesday morning information sessions. Usually Ana preached about STIs, condoms, annual exams, nutrition, and sometimes there was a craft to learn. I most enjoyed the sessions where the pregnant mothers would break out and discuss what to expect in pregnancy and birthing. These could be repetitive and were not in depth, but I suspect that this is the level where these women were at, and repetition was needed, especially since not everyone came every time. This execution could be improved for teens in school by allowing for a half-day of attendance rather than a full day. The risk is that those in school may choose to drop out and attend the full day since a half-day is not an option.

Though the Center Julieta seeks to improve child development and psychology in social setting, my first day at the center was overwhelming. One baby

played by the stairs, in danger of toppling down. An older girl combed the hair of a younger one, who fussed in protest. A child hoisted himself to standing using the coils on the back of the fridge; it teetered. Fortunately this was a day that was a bit crazier than usual, and even with the lack of safety standards, there were fewer rescues on a daily basis. Though the implementation is not perfect, we can only imagine that the babies would be even less cared for at home. For example, Rose, now 45, had been a teen mother of twins. She lived with her husband rather than with her mother. When the children would cry, so would she. Her mother would come over to help out and find all three of them crying! Though now many more young women maintain lodging with their mother, allowing for more support in housekeeping, on its best days the Centro provides further instruction and parental modeling to teen mothers, as well as an accepting community.

The government offers a program of this nature, Projovem, but it is for adolescents in general and is not targeted to mothers. Projovem is a restructuring of a previous program, Agente Jovem, which served at-risk 16-24 years of age. Participants received a monthly stipend (\$40) for completing a year of courses which covered citizenship, sexuality, and sometimes vocational training. Now Projovem Adolescente serves 15-17 year olds and is not accompanied by a stipend, though Projovem Trabalhador (worker) does, providing vocational training for the unemployed under 29. Bolsa Familia, however, was also amplified in 2008 to provide a stipend (\$15) for up to two 16-17 year olds per family; before the stipend stopped at age 15. While those who are enrolled in Bolsa Familia are able to enroll in Projovem Adolescente, they do not have additional conditionalities related to Projovem that limit the stipend; to receive Bolsa Familia, however, there is a school attendance requirement.

([www.mds.gov.br/suas/guia_protecaao /projovem](http://www.mds.gov.br/suas/guia_protecaao/projovem))

The government provides finances to municipalities to implement ProJovem if it has a sufficient number (40) of at youth risk. Similar to PETI and Jovem Aprendiz, the municipality can sub-contract an NGO to provide the services. During my exploratory fieldwork I visited a group of Agente Jovem. That day they were playing soccer and later had a discussion. The leader explained they could not always do as much as the curricula required due to the funds not arriving; sometimes classes were canceled, and students were not interested in coming when the snack was so unsatisfactory.

While I have not continued to interact with the ProJovem program, the curricula does not include a portion directed to teen mothers, though they do discuss intergenerational tensions. They certainly do not offer day-care to children. While they would be a supportive community group for adolescents, as is the Centro Julieta, the logistics seem to discourage teen mothers from participating in them, and the content is not directed toward their needs. The government could consider adapting the program for this special group of young people.

The next model of social agency addressing the needs of teen mothers is the home visit model. The decentralized organization Pastoral da Criança works to improve children's nutrition. While the Pastoral is a Catholic organization, people of all faiths use its services, as it is widely recognized. Doctors refer patients to the Pastoral, and it was nominated for a Nobel Prize. I was introduced to the Pastoral through one of my enumerators who had participated as a local leader doing home visits and monthly weighings.

Leaders undergo a multi-week training session to be certified. They learn

how to weigh the children and go through the handbook that covers parenting, health, and hygiene for children and pregnant women. Once they are in the program, at monthly community meetings they plan events and discuss challenges. Everyone is a volunteer, and community and regional leaders are democratically voted in. The monthly weighings take place at a local church. Mothers bring their children under age six to be weighed by the Pastoral leaders. They have set up a large scale hanging from the rafters and are trained in the somewhat complicated procedure of calibrating the scale, ensuring that the children are not wearing shoes or too much clothes, and adjusting the weight of the child if they are wearing a diaper. The atmosphere is merry, albeit a bit chaotic with so many children, and everyone is anticipating a tasty snack. A recent addition to the roles of leaders and assistants in the Pastoral is *brincadista*, the game coordinator, who also livens the mood.

Countering health risks, the children who are identified as underweight receive special treatment. They often are given *multimistura*, a highly nutritious supplement prepared by those in the Pastoral consisting of grains, seeds, and powdered egg shells. While all families receive a monthly visit where the leaders talk with the parents about healthy child development and encourage sanitary and nutritious practices, the families with underweight children receive more attention, with longer or more frequent visits.

Even though there are Christmas parties with presents for the children, and parents are not charged for the *multimistura*, the Pastoral does not want to be associated with donations. In my study, they wanted to be sure that all the participants understood that the remuneration was not coming from the Pastoral. The leaders do wish to promote dependency on the Pastoral, for it becomes

very uncomfortable when mothers come clambering for handouts.¹⁵ The leaders prefer to be an educational organization providing community support. In some sense they also provide a psychological or religious service, as they give mothers an opportunity to talk to someone and share burdens. Several leaders expressed that with some families they felt helpless, unable to provide any sustenance, but sensed that their presence was still a comfort for the mother.

The Pastoral does not target teen mothers in any way, and including a separate section in the handbook on their special needs would be helpful. As is the trend in development economics, a multi-dimensional measure of child risk could be used besides just weight. (Malnourishment has decreased significantly in Brazil, certainly due to the work of the Pastoral.) With age of the mother being one factor in this index, the Pastoral could take a little more time with these families. Of course, leaders are doing their own mental assessment of poverty and risk when they visit, and they already inquire about breastfeeding and vaccinations. Never-the-less, a standardized evaluation could be helpful and aid the Pastoral in determining what goals to target in the future.

The one-on-one interaction offered by the Pastoral can be advantageous for teens. Not only does the Pastoral arrive at their homes, eliminating concerns about transportation and day-care, but the intimate interaction allows for teens and leaders to know one another better than in a group setting. A leader can observe and help a teen in her own home, and a teen may feel comfortable asking a leader questions without a group of outsiders. Especially in the pregnancy stage, health and hygiene topics are sensitive.

¹⁵Also for the project they did not want money used because they did not want the recipients to use it for drugs. They were eventually comfortable with us providing payment with vouchers from grocery stores.

The Pastoral receives the majority of its financial resources for administration from the Brazilian Government, though company and private donations also help with funding (Pastoral website). Yet none of the local volunteers receive any payment. While this system ensures a degree of interest in the endeavor, this also limits the continuity of care. Volunteers do not always appear, or become too busy and must leave the program without replacement. I do not suggest that the Pastoral pay its volunteers, but the government must take this limitation into consideration when working in tandem with the program.

Government health clinics have community agents who provide services similar to those of the Pastoral, though on a broader range of topics; they also visit the elderly and promote dengue prevention, for example. These workers are recruited from within the community, and they also pay mothers monthly visits to address similar topics and weigh babies with scales that aren't as complicated as those of the Pastoral. One of the leaders of the Pastoral complained that her status had diminished now that the government was providing these services (though with unstable budgets, strikes do happen, and community agents can have caseloads that are too large). Since the government pays for both the community health worker and the Pastoral, it would be beneficial to coordinate their activities. Though some overlap is likely, and reinforcement of health education beneficial, redundancy is not desired. I suggest that the government, with better possibilities for standardized training and consistent service, focus on basic needs like vaccination and malnutrition, while the Pastoral can move on to a holistic developmental focus, one they already use, but would further emphasize parenting and child development, as well as involving the entire family (father, grandparents) in the community activities, not just the mother. This is just one suggestion for possible coordination strategies.

As mentioned earlier, over 60% of the families in my sample receive Bolsa Familia, which represents the final category of social service models, the conditional cash transfer. These programs seek to alleviate poverty through two mechanisms. Not only do families receive payments, but they only receive them when children are vaccinated and attending school. These efforts promise to improve the lives of the children in the future as well as the present. Requiring much funding, I have not seen any private organizations undertaking such an effort in Brazil.

Since so many teen mothers receive Bolsa Familia, this is an ideal program through which to operate as it already has a wide coverage of teen mothers and it is well-aligned with the goal of mitigating intergenerational poverty. Families can receive money for both teens (if they are less than 17) and their babies; the funds are directed to a family household head, usually the grandmother. As found in the empirical study, targeting stipends toward the teen rather than the grandmother would probably not significantly change the outcome for the baby, and might become an incentive for teen pregnancy. What we may consider instead, would be to alter conditions for teen mothers and their children. Again this is a delicate process, since these must not be so difficult that teens do not comply and the family loses the stipend. Yet these additional requirements may also be discourage others from becoming pregnant. On the other hand, we saw that requirements were not being met by all who were in Bolsa Familia families. Any additional requirement must be attractive or easy for teen mothers so as not to deny them the needed stipend.

Our other models, home visits and community groups, are inspiration for possible new conditionalities. Not only are government programs in place that

can be adapted to serve teen mothers, but the activities can be made attractive to the teen. Home visits do not require the teen to leave the house while community groups provide socialization and support that the teen would enjoy. Both of these can also reinforce compliance with the other requirements, encouraging teen schooling and helping the family ensure that the baby is vaccinated on time.

Of most convenience to the teen mother would be appointments with the community health worker, who would receive special training to work with teen mothers. The program should be complementary to that of the Pastoral, rather than redundant. To ensure that the health worker also has incentive to guarantee the appointment, s/he could receive a bonus when the teen was served more than the minimal amount. Measures would have to be taken to guard against fraud and to confirm that the teen would receive the stipend should the community worker be sick or on strike. In addition to improving health and hygiene practices, the community worker can encourage the family to focus on the child's developmental progress and encourage nurturance.

Incorporating the teen into a support group would be more challenging since funds require a central location, and daycare vouchers may be necessary. School in the morning and an afternoon program may be too much stress on teens' busy nursing schedule. Perhaps teen mothers would only attend once a week and could bring young children. Interacting with children may help with prepare other teens to become parents later, and would also remind other young women what a large task parenting is. As they talk amongst themselves, non-mothers would realize that participation is a requirement of the stipend only for teen mothers, de-emphasizing any economic incentive that would arise from being

a Bolsa Familia recipient when having a child.

For those who manage to participate more often, day care vouchers could be provided. More frequent attendance would give the teens an opportunity for vocational preparation that might not be available otherwise. While it would be ideal to modify ProJovem to develop a module for teen mothers, one concern is that not all municipalities have ProJovem programs. Perhaps in non-ProJovem municipalities, alternative programs could be arranged or different NGOs contracted.

The discussion thus far has focused on teens, but not looked at the role of the grandmother. A simple inclusion in home visits by the community health worker would also seek to engage the grandmother in the teaching and learning; a psychological intervention could also attempt to break the blaming cycle. With regard to activities outside the home, if Bolsa Familia does extend a parenting class requirement to teen mothers, the grandmother would become involved in helping her daughter attend, as she is the one who receives the transfer. Having the grandmother support participation in a community program is likely to improve harmony in the family. If it were an optional program, the grandmother may scold the daughter for shirking home duties. Instead, she will contribute her efforts toward the daughter's attendance. This alignment of incentives gives the child the best chance of having a family with less conflict, a more skilled mother, who will have help keeping him on the vaccination schedule, and his family will have a little more financial support from the Bolsa Familia stipend as he grows. Though this adds an additional conditionality to Bolsa Familia for teen mothers, it should be one that is pleasant and enjoyed (though not too much so that other young girls won't want to become

teen mothers), and that supports the other conditions being met.¹⁶

4.3 Conclusion

This paper has addressed the importance of qualitative research methods for economists in two ways. First I discussed the valuable insight they can bring to the quantitative methods themselves; instruction in qualitative research has been ignored within economics to its detriment. In the second portion of the paper I presented a case study illustrating how a qualitative analysis has allowed for a much broader understanding of the risks children face and the family structure in which they live. These reflections as well as further ones evaluating alternative models of social agencies contribute much insight to policy suggestions to assist teen mothers who live with their mothers.

Due to the initial quantitative goal of the research, these qualitative analyses are not as detailed nor as thorough as if an anthropologist or sociologist had done them. With a quantitative goal, there is little time for in-depth, open-ended interviews and transcriptions that would allow for a meticulous analysis of the subjects. Yet there is rich knowledge to be gleaned from bountiful experiences had while preparing quantitative instruments and participating with the institutions that interact with these families.

I surprisingly find myself willing to make more emphatic conclusions about the qualitative observations than the quantitative results. Even though the

¹⁶As culture accepts intergenerational households of single mothers as the norm, mothers may come to expect their daughters to live with them. If this is the case, as shown in Chapter 1, the mother may have incentive to damper the daughter's education in order to protect her own bargaining power in the household. The educational conditionality for receiving Bolsa Familia also works against this possibility.

Table 4.1: Comparative Chart of Social Assistance Models

Types of Social Service Models that could benefit Teen Mothers	Conditional Cash Transfers	Home Visits	Community (Mothers') Groups
Programs that are Government Provided	Bolsa Familia	Community Health Agent	ProJovem (but not directed toward teen mothers)
Non-Governmental Programs	N/A	Pastoral da Crianca, a ministry of the Catholic Church	Centro Julieta, an NGO
Interaction level	Minimal, with grandmother	1 on 1, can include grandmother	Depends on group/class size; not grandmother involvement
Coverage	Nationally	Limited by number of volunteers	Limited by available community organizations & space
Location	Health posts/public schools	At participant's house and local church for the monthly weighing	At community center
Risks addressed	Poverty from transfers, health from vaccination condition	Health through weight monitoring and education, developmental through education, maybe psychological depending on the leader	Psychological through adolescent support group, developmental and health through education, perhaps poverty if includes meals
Time commitment for participant	Time to fulfill conditionalities	Several times a month	Can be daily
Benefits for recipient	Monthly stipend; vaccines fulfilled & education continued	Mutimistura if necessary, parenting education, 1-on-1 support, some community participation	Snacks/meals, parenting education & participation in a community group
Overall Disadvantages	Little direct parental instruction	Volunteer based implies non-guaranteed coverage, interaction only a few times a month	Can be expensive, limiting coverage; requires a community center site & paid leaders
Overall Advantages	Large coverage, centralized administration minimizes costs, basic needs met	Local volunteers know participants well, can be very dedicated. Good where government services/infrastructure is low.	Provides a community for teen mothers and, if children are present, provides observable alternative models of parenting and constant feedback

statistics have a confidence interval, memories of survey packets limp and wilted from humidity and a long pauses of “um, I don’t know” before an estimation is prodded out by an enumerator, haunt the numbers. Once I tried to purchase a measuring tool for babies’ height, but the ones sold in medical stores were not accurate - they did not form a right angle; eventually I designed my own to be constructed by a local carpenter, but hold less faith in official statistics. My personal experiences in administrating such a project leave me much more suspect of quantitative data in general.

Economists may have some hesitations about doing qualitative research without the “proper” training, and of course, it should be undertaken. Yet, until it is solidly part of the economic curriculum, we can take heart in the words of anthropologist Clifford Geertz, without letting them become an excuse to be ignorant of qualitative procedures: “From one point of view, that of the textbook, doing ethnography is establishing rapport, selecting informants, transcribing texts, taking genealogies, mapping fields, keeping a diary, and so on. But it is not these things, techniques, and received procedures that define the enterprise. What defines it is the kind of intellectual effort it is” (1973, pg 6).

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APPENDIX A

TECHNICAL APPENDIX TO CHAPTER 2

This appendix revisits the models discussed in the text, and the statistical tests relating to each game are formally derived. As in the main body of the paper, the capital subscript will indicate from which person the variable arises; the non-capitalized subscript refers to who owns the endowment in the bargaining game. I assume that utility associated with preexisting levels of consumption does not enter into the decision making process; this gives the families a maximum possible income of R\$9 in the bargaining game. Let U_G and U_T be the utility functions of the grandmother and teenager respectively, taking on the normal characteristics of a utility function. x_G and x_T are private goods and z is a public good as represented by the baby book.

In the unitary model, one person makes all the decisions or there is a shared utility function. $U_{family} = U_G(x_G, x_T, z)$ if the grandmother is the dictator. In the bargaining game she chooses v_G^* , the monetary valuation she places on the book, such that the utilities are equal whether or not the baby book is purchased at price v_G^* .

$$\begin{aligned} \max_{x_G, x_T} U(x_G, x_T, 1) &= \max_{x_G, x_T} U(x_G, x_T, 0) \\ \text{s.t. } x_G, x_T &\leq 9 - v_G^* & \text{s.t. } x_G, x_T &\leq 9 \end{aligned}$$

This v_G^* is her willingness to pay, an approximation of the utility of the counting book. this valuation is accurate because the price is chosen at random. Faced with chance, the participant has no incentive to name a higher valuation than v^* and risk paying more than she would like for the good, losing out on some

additional utility from private consumption goods that the extra money could buy. Nor will the dictator choose a price lower than her true willingness to pay since she finds the value of the good higher than the additional marginal utility achieved from the private expenditures and would actually prefer to own the good. Thus the valuation she selects reveals her willingness to pay, approximating her utility of the good in dollars.

The non-dictator valuation is meaningless in real life, as the dictator's decisions will override the other's, providing a null hypothesis for the dictator-unitary model at the population level: the joint valuation is equal to the grandmother's or teen's individual valuation. A difference in these allow us to reject this hypothesis; we are unable to do that with this data.

Though the non-dictator usually takes a back-seat, in this game, since the non-dictator's valuation may still be chosen, this individual may engage in some strategy. Suppose the non-dictator is self-interested, as in Becker's rotten kid theorem, not caring for her mother's consumption. Then she will find a v_T^* that solves

$$U(x_T^*(9 - v_T^*), 1) = U(x_T^*(9), 0)$$

where x_T^* is the solution to the dictator's maximization problem. Thus the non-dictator's valuation is not likely to represent her actual utility from the baby book, unlike the dictator's valuation; her valuation will be skewed by the transformative function x_T^* . In this model, any comparisons made between the valuations do not necessarily represent a comparison in utility, though they do provide insight to behavior.

As long as x_T^* is a normal good, the non-dictator wishes to maximize household income. The dictator will wish to do so, as well, indicating that Pareto optimality is a characteristic of this family. To test Pareto Optimality at the population level, a one sided t-test is applied to the sum of the contributions by teenager and grandma in the trust game.

$$H_0 : C_T + C_G = 5$$

$$H_a : C_T + C_G < 5$$

The data from the trust game reject the Pareto optimality hypothesis for the population as a whole, as well as for the subset of the population of families who understood. This implies that the unitary model cannot hold as a model at the population level since efficiency is violated.

Though rejecting the unitary model for the population due to the Pareto efficiency violation, the discussion would not be complete without considering a unitary model of consensus. This model suggests that all family members have the same utility function and thus all will arrive at the same valuation. At the population level an F test can consider if all the valuations may follow the same distribution, or if they should be divided into three different categories and be considered separately. With V a valuation and T a dummy if the valuation is the teen's and G a dummy indicating the valuation is the grandmother's, $V = T + G + \epsilon$ should have the coefficients on both T and G be zero if the consensus model holds. The complication is that we must take into consideration any confounding effects of changing the order of valuations, an experimental variation. Additionally, there should be no effect from changes in ownership endowment, a feature of bargaining. We find that this is the case, but first we

discuss this test of bargaining, and afterward we shall return to complicate the statistical test with all its components.

Cooperative Bargaining, or the collective model, is Pareto efficient by definition, so for this model to hold at the population level, the Pareto efficiency hypothesis must hold, which we already rejected. However, the analysis of the bargaining game is interesting and may be analyzed at the family level, so let us continue. In a stylized example without altruism, the family maximizes

$$\theta U_T(x_T, z) + (1 - \theta)U_G(x_G, z)$$

$$s.t. x_T + x_G + z \leq y$$

where θ is the sharing rule: any income (y) left over after expenditures on z are divided according to this rule. When the teenager is asked privately for her valuation of the counting book, she chooses her valuation v_T such that

$$U_T(\theta(9 - v_T), 1) = U_T(\theta 9, 0)$$

If utility is money metric in x_T , let UBB_T be the utility of the baby book for the teenager.

$$\theta(9 - v_T) + UBB_T = \theta 9$$

$$\frac{UBB_T}{\theta} = v_T$$

Since $\theta < 1$, the valuation chosen by the teenager is an overstatement of her utility. If the power coefficient θ is derived from income, then when the recipient of the endowment changes, there should be a different θ , say θ_g when the

grandmother is owner and θ_t when the teen is owner. The magnitude of the change does not have to be very large to be detectable in this experiment. Suppose a teenager's utility of the baby book to be R\$2. If the power in the family is divided evenly when she receives the endowment, then her valuation shall be 4. Even a mere 15% decrease in the sharing rule when her mother owns the endowment could be perceivable, with the teenager's valuation increasing to 5. This sensitivity is cardinal, however, with changes more perceptible at extreme values of theta. For example, from a change in θ from .89 to .85, the individual with more power and a utility equal to 1 is unlikely to change her valuation from 1, as the exact valuations are 1.12 and 1.18, but the other individual will certainly change her valuation as with a base utility of 1, her valuation goes from 9.09 to 6.66.

This variation of ownership endowment in the experiment does not happen in each family, however, so its effect is only testable on the population level. This implies the simple test of the bargaining model: $v_{gT} \neq v_{tT}$ or $v_{gG} \neq v_{tG}$. If either holds, bargaining is confirmed. Yet we have already determined that on average, families are not Pareto Optimal, ruling out the possibility of a cooperative model. Might this same test be useful for confirming non-cooperative bargaining as well?

Suppose that in a non-cooperative model a sharing rule still exists for dividing income, but the expenditures on public goods are decided individually, rather than jointly. Thus the model follows the structure of a Cournot equilibrium, where each individual separately decides how much to invest in a public good, arriving at a non-efficient result. The teenager, for example, faces this maximization problem:

$$\max_{x_T, z_T} U_T(x_T, z_T + z_G)$$

$$s.t. x_T + z_T < \theta y$$

The grandmother solves her corresponding problem. Note that when the sharing rule is 0 or 1, the person with all the income will not purchase the private good for the other. This may be why in the trust game, a small amount is reserved for individual purchases if it can be hidden. Taking this supposition even further, if there were no public good, then nothing would be contributed in the trust game if hiding is feasible. This was not an outcome, however, so it is unlikely that pure individualism reigns in these families.

When asking for individual valuations of the baby book instead of contributions for a joint purchase, the bargaining game asks a different question than in many public goods scenarios. Yet this focus allows the analysis to be the same as in the cooperative bargaining game, with $v_T = \frac{UBB_T}{\theta}$. Thus the same statistical test of a change in valuations with a change in endowment can be used. In the non-cooperative game the joint valuation may have a different relationship to the other two valuations, however, than in the cooperative model. Suppose the decision about v_j^* is made using the budget constraint since there is no joint utility function by which to maximize.

$$\theta(y - v_j^*) + UBB_T + (1 - \theta)(y - v_j^*) + UBB_G = y$$

Substituting in UBB_T and UBB_G , we have $v_j^* = \theta v_T + (1 - \theta)v_G$, a linear combination of the individual contributions. All else constant, the joint valuation arrived at in the non-cooperative family will be greater than that in the cooperative family, due to the inefficiencies.

We have thus completed the necessary discussion to return to our test of the models in the book game. We have two variations in the experiment (the endowment ownership and order of the valuations) and within the experiment three valuations. If we find a significant difference between individual valuations under different endowments, we have confirmed bargaining. Otherwise the unitary model cannot be rejected. We are also concerned that valuations may shift under the order of the valuations: perhaps with more or less time people desire the book differently. Finally, though we may not find the source of variation in the experiments to cause differences, there may be inherent differences in how teenagers and their mothers value the book; a significant difference in valuations disprove a consensus model as we discussed earlier. Likewise, if the joint valuation is not significantly different from one of their valuations but significantly different from the other, a dictator model is implied.

We can simultaneously test all these individual variation effects as well as interaction effects within one regression model. Let TV, GV, and JV be dummy variables representing that the valuation belongs to teenager, grandmother, or is the joint valuation. Let J1 and J2 be dummies indicating if the joint valuation was given first or second. Let TE and GE be dummies indicating if the endowment was given to the teenager or the grandmother. Choosing a base comparison case, such as JV J1 TE, regressing the other variables and their interactions indicate if there are significant differences in V, the monetary valuations, from this base case.

$$V = \beta_1 TV + \beta_2 GV + \beta_3 J2 + \beta_4 GE + \beta_5 TVJ2 + \beta_6 TVGE + \beta_7 GVJ2 + \beta_8 GVGE + \beta_9 TVJ2GE + \beta_{10} GVJ2GE + \epsilon$$

More permutations determine significant differences from other cases. Not

finding significance of any single variable, nor joint significance, we are able to pool the variables and look at just one experimental variation at a time. These statistics, reported in Table 3.11 likewise do not indicate any effect. The unitary model, in this case of bargaining over a baby book, has not been refuted at the population level. Before we discussed the results of the trust game, in which we rejected the Pareto optimal hypothesis. This finding is not supported by the unitary model, leaving us with an unexpected contradiction.

Since valuations are a function of the sharing rule θ and individual preferences, we can hypothesize that family and individual characteristics may affect this and in turn the valuations. When I include these in the model, I find no significance. (This iteration is not reported.) However, when we include a dummy variable representing Pareto optimality and another for “not understanding the trust game” in the equations, the coefficient on Pareto optimality is large and significant; in efficient families, all valuations are lower (see Table 3.11). This exploration is not based on a specific functional form from the theory, but never-the-less is justified since both games test a different aspect of the same model: we suspect that the behavior exhibited in one game is related to the behavior in another game. Continuing further, I divide the sample into the groups efficient, non-efficient, and not-understanding and run the original regression to determine if one of these sub-groups may exhibit bargaining behavior. We find significant differences in valuations in the book game only for non-efficient families (see Table 3.12).

This concludes the explanation of formal links between the statistical tests used in the paper and the analytical models of household. Statistics and analysis are found in the “Results” section.